UNIVERSITY OF KWAZULU-NATAL

THE BARRIERS AFFECTING GREEN LOGISTICS IN THE SOUTH AFRICAN PHARMACEUTICAL INDUSTRY: A CASE STUDY OF CIPLA, SOUTH AFRICA

By

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DECLARATION

1) I, **Aveshin Reddy** (Student Number: 211542196) hereby declare that this dissertation titled "The barriers affecting green logistics in the South African pharmaceutical industry: A case study of CIPLA, South Africa" is my unaided work.
2) All references, citations, and borrowed ideas in the thesis have been acknowledged accordingly.
3) I confirm that an external editor was not used for the thesis.
4) The thesis is being submitted for the degree of PhD in Environmental Science in the College of Agriculture, Engineering and Sciences, University of KwaZulu-Natal, Durban, South Africa.
5) The PhD thesis has not been submitted previously for any degree or examination in any other university.

[redacted] 25/08/2024

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Aveshin Reddy **Date**

As the candidate's Supervisor, I agree to the submission of this thesis.

[redacted] 25/08/2024

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Professor Urmilla Bob (Supervisor) **Date**

DEDICATION

This thesis is dedicated to:

Sasha Badul Reddy

and

Julie Reddy

May the establishment of sustainable development continue to support and grow the pharmaceutical sector whilst ensuring that the environment is protected so that future generations will thrive.

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ABSTRACT

The pharmaceutical industry is one of the most significant contributors to environmental degradation globally but also an essential contributor to the well-being of people. Organisations and humanity are dependent on this life-giving industry even though it impacts the environment negatively in various ways. This has driven pharmaceutical organisations, governments and international bodies to probe into methods of incorporating sustainable development within the sector, which has driven the establishment of green supply chain management (GSCM) and, subsequently, green logistics. The identification of the barriers impacting GSCM and green logistics is critical to the promotion of this sustainable initiative within the pharmaceutical sector in South Africa. The purpose of this study was to critically examine the barriers affecting green logistics in the South African pharmaceutical industry by using a case study at CIPLA Medpro Manufacturing. The significance of this study is to bridge the knowledge gap on the barriers impacting green logistics within a South African context. The study population comprised of thirty Logistics Department staff members at CIPLA Medpro Manufacturing. This study used a mixed methods approach through the analysis of both quantitative and qualitative data. Existing literature was reviewed, face-to-face and online surveys were conducted with employees and a key informant interview was undertaken in 2021. The key informant was the logistics manager who was purposively chosen. All thirty staff members responded to the survey, and the data was analysed using the Statistical Package for the Social Sciences (SPSS) software. In relation to the objectives, the study findings show that CIPLA Medpro Manufacturing is currently involved with GSCM practices such as the recycling of water and paper, reverse logistics, use of reusable materials, incineration of hazardous materials, sludging of hazardous waste, shredding of waste packaging materials and the reduction of electricity usage. It was also identified that logistics staff members did not perceive environmental issues such as climate change as being the most important factor impacting society but did identify environmental concerns as one of the top five factors impacting business. It was also highlighted that a number of staff members did not have a comprehensive understanding of climate change or the environmental strategies employed by CIPLA Medpro Manufacturing. The most significant external barriers impacting green logistics and GSCM at CIPLA Medpro Manufacturing were a lack of government support, a lack of awareness by society, a lack of knowledge and experience by suppliers and pressure for lower prices of products. The most significant internal barriers to green logistics at CIPLA Medpro Manufacturing were the high costs associated with the adoption of green logistics and GSCM

initiatives, lack of training on green logistics initiatives, a lack of understanding to incorporate green buying and a lack of skilled human resources to implement GSCM initiatives. It was determined that CIPLA Medpro Manufacturing did not have sufficient countermeasures in place to combat the internal and external barriers impacting green logistics and GSCM at CIPLA Medpro Manufacturing as it was not a core competency, according to the key informant and survey respondents. A recurring theme identified within the study was a lack of awareness and knowledge of GSCM and green logistics, which impacted respondents' responses. This research identified that knowledge, awareness and training are significant barriers to GSCM and green logistics within a South African context. Based on the findings of the study, pharmaceutical organisations should prioritise the training of staff to ensure that they can effectively implement and maintain these sustainable initiatives and identify risks and barriers. Hence, the recommendations that were made in this study are to incorporate a three-phase training system that would improve employee knowledge and capacitate them to be able to successfully implement GSCM and green logistics initiatives. It was also recommended that CIPLA Medpro Manufacturing focus on developing a culture that fosters the support of GSCM and green logistics initiatives and creates an alignment between GSCM initiatives and government incentives. These recommendations can be extended to other corporations as well, to transition enterprises to embrace green logistics that support sustainability and corporate responsibility to protect the environment while responding to socio-economic demands.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial Resistance
ARV	Antiretroviral
ANOVA	Analysis of Variance
COVID-19	Coronavirus 2019
CSCMP	Council of Supply Chain Management Professionals
DNA	Deoxyribonucleic Acid
GDP	Gross Domestic Product
GSCM	Green Supply Chain Management
HIV	Human Immunodeficiency Virus
IBM	International Business Machines
ISO	International Organisation of Standardisation
IT	Information Technology
JSE	Johannesburg Stock Exchange
MCC	Medicines Control Council
NASA	National Aeronautics and Space Administration
NFSD	National Framework for Sustainable Development
PhD	Doctorate in Philosophy
SCP	Sustainable Consumption and Production
SPSS	Statistical Package for the Social Sciences

CHAPTER ONE: INTRODUCTION

1. Introduction

1.1 Preamble

Over the past decade, sustainability has grown in importance to both supply chain practitioners and scholars alike (Gölgeci et al., 2023). Pressures from internal and external factors are driving companies to become more sustainable for both society and the environment (Alsmairat and Aldakhil, 2022). Increase in government regulations and heightened consumer awareness have contributed to the movement toward sustainability (Jayaraman et al., 2023). If organisations want to remain relevant to current market requirements, they need to implement and maintain flourishing green practices (Kasperson et al., 2022). According to Velte (2021), many leading companies have recognised the critical importance of managing and controlling corporate, social and environmental performance. The movement towards the adoption of a corporate strategy to integrate social, environmental, and economic impacts is driven by both internal and external factors. Two common internal factors are a management commitment to sustainability and the recognition that sustainability can create financial value for the corporation through enhanced revenues and lowered costs (Zumente and Bistrova, 2021). Velte (2021) also suggests that the leading impetus for a sustainability strategy is created by external pressures such as government regulation, marketplace demands, competitors' actions and pressure from non-profit organisations.

According to Mughal et al. (2022), environmental damage from industrial and economic development is destroying natural support systems. Kasperson et al. (2022) suggest that environmental consciousness is increasing to highlight that a fundamental change in the way society uses its natural resources is needed, especially if society decides to advance on pressing environmental concerns such as global climate change and ecosystem degradation. Breuer et al. (2023) claim that some companies have not developed any coherent sustainability strategy or management of their social and environmental impacts. Negative social and environmental impacts have tarnished the reputation of many corporations. It is evident that sustainability has become an essential process for organisations. Sharma and Singh (2021) state that organisations should not underestimate their ability to turn corporate social responsibility into a competitive advantage. Banik (2022) suggests that the knowledge gap in areas such as Green Supply Chain Management (GSCM) needs to be addressed as this is a key area in the operations of most companies and, therefore, a key role player in the adoption of green practices. Aguilera et al. (2021) argue that the reason for the knowledge gap in sustainability is the lack of research and focus of both academics and corporations on sustainability.

According to Asamoah et al. (2023), GSCM initiatives are a proven method to incorporate sustainability into an organisation and its operations. GSCM initiatives expand sustainable performance beyond the walls of the organisation (Uddin, 2021). Supply chains are critical to the success of an organisation and involve several stakeholders that are both internal and external to the company. Many supply chains have grown into global value chains through advancements in technology and globalisation, which amplifies their impact on the environment and society (Nawaz and Rahman, 2023). The increase in pollution, environmental degradation and various other negative by-products of supply chain operations have also grown exponentially as a result (Banik, 2022; Mughal et al., 2022). The recent developments have also placed further pressure on supply chain stakeholders due to increases in supply chain complexity and the lengthening of supply chains (Nawaz and Rahman, 2023). Therefore, the role of GSCM as a core driver of sustainable development has become even more crucial to both improve environmental performance and establish robust supply chains to help organisations navigate the growing number of threats that affect their performance (Banik, 2022). This is where a crucial green initiative known as green logistics has begun to play a prominent role within various industries by improving environmental performance and operational efficiencies, according to Hussain et al. (2023) and Wang et al. (2018). Green logistics involves several operational elements such as warehousing, transportation, operations management and waste management as noted by Shu et al. (2023). The concept of green logistics is relatively new and is not fully understood as there is very little empirical research that focuses on how facilities and industrial organisations are integrating green logistics and managing the barriers that impact this initiative, it is this gap in the knowledge that the study aims to address.

1.2 The motivation for the study

The two most prominent motivating factors for the study are the knowledge gap and the need for research on GSCM practices, with a specific focus on green logistics. Very few studies have been conducted in South Africa focusing on the barriers to green logistics within the pharmaceutical sector. This is a critical topic because supply chain operations make up a large portion of organisational waste and pollution and are arguably one of the most important functions in an organisation.

Green logistics is the component within GSCM that focuses on the movement, operations and storage of products and services within an organisation, which, according to Caprian et al. (2023), is one of the most crucial elements in GSCM. de Souza et al. (2022), Trevisan et al. (2023) and Umar et al. (2021) further emphasise this by stating that many organisations have lack of confidence in green initiatives as a result of a lack of knowledge. This is supported by Aroonsrimorakot et al. (2022) and Bashar et al. (2022), who state that the identification and analysis of the various factors impacting GSCM and green logistics are critical to the successful implementation and adoption of these sustainable initiatives. Therefore, this validates the need for research into GSCM and green logistics.

According to Hermawan et al. (2023), the pharmaceutical industry is one of the most impactful on both the environment and society. Nawaz et al. (2023) further support this by stating that pharmaceutical products and the manufacturing of these products are some of the most hazardous to both human and animal life. However, according to de la Torre and Albericio (2021), the pharmaceutical industry is a crucial support system for the protection and well-being of human life globally. The absence of pharmaceutical products would cause a global collapse in the health sector and threaten the existence of human life (Barlow et al., 2021). This has become evident in the past five years with the rise of several pandemics, such as Coronavirus 2019 (COVID-19), which has caused a great loss of human life globally. Therefore, it is critical to ensure that the pharmaceutical industry and sustainable development are integrated to ensure the future of both the environment and humanity. According to Pansare et al. (2023), GSCM bridges the gap between sustainable development and pharmaceutical production. Therefore, the successful implementation and adoption of GSCM and, subsequently, green logistics is critical to the success of sustainable development within the pharmaceutical sector.

In South Africa, the role of the pharmaceutical sector has been exacerbated due to economic instability and the prevalence of pandemics such as COVID-19, tuberculosis, Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) (Nyawo, 2023). This increases the need for affordable and effective pharmaceutical products to combat both the rise of various pandemics and financially vulnerable populations. The need for the successful implementation of GSCM and green logistics initiatives within the pharmaceutical sector is, therefore, critical in countries such as South Africa; however, limited research is available on the factors impacting these sustainable initiatives. This limits the ability of pharmaceutical companies to adopt and maintain effective GSCM and green logistics initiatives, which is the gap that this study aims to fill. Figure 1.1 depicts the need for research on the barriers to green logistics and highlights the impact that a lack of knowledge has on organisations within the pharmaceutical industry. The need for research on the barriers impacting green logistics within the pharmaceutical industry is crucial as it impacts an organisation's ability to implement this initiative, as mentioned earlier. This is further impacted by the lack of research in this field, especially within a South African context. Together, these two elements contribute to the failure of green logistics initiatives, as indicated in Figure 1.1.

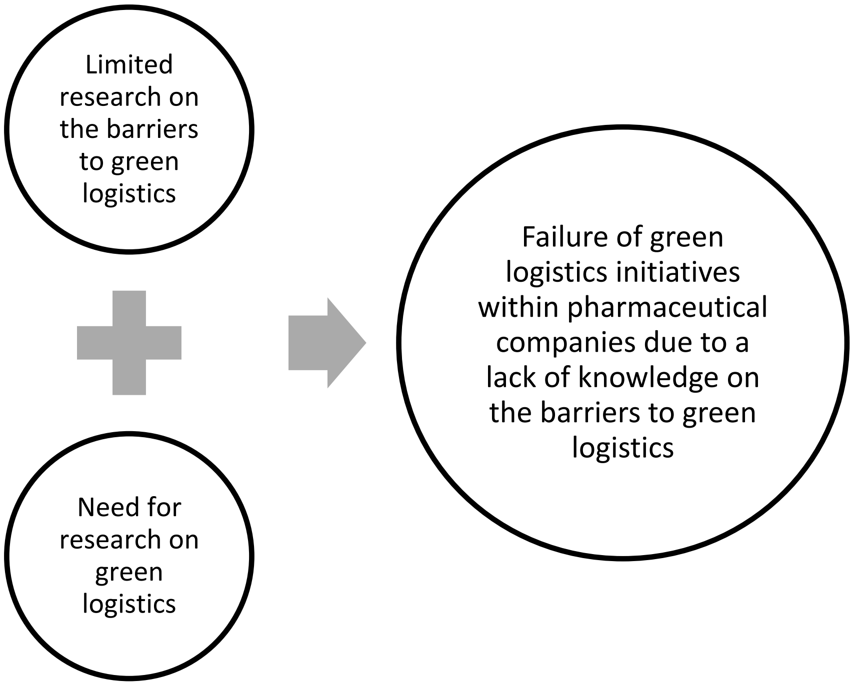


Figure 1.1: The impact of limited research on the barriers to green logistics

The knowledge gap that this study aims to bridge is the lack of information on the barriers affecting green logistics within a South African context. Current literature pertaining to the topic looks at companies operating in different countries, and, as such, they cannot be generalised to a South African context. The reasoning for this is that South Africa has a culture, economic environment and political standing that is unique to the country. This is emphasised by Ali and Kaur (2021), who state that most literature on sustainability, especially in corporations, focuses on a context that is unique to a specific geographic location and is difficult to generalise to different industries and countries. This highlights the importance of the study, which is to bridge the knowledge gap between the barriers affecting green logistics in South African pharmaceutical companies and the current body of knowledge, which is limited to foreign countries.

1.2.1 Need for research on GSCM and green logistics

Supply chain management is a core department in most organisations as it encompasses functions such as manufacturing operations, purchasing, transportation and physical distribution (Omotayo et al., 2023). These are core operations of an organisation; as a result, they also play a pivotal role in sustainability which highlights the importance of GSCM. The field of green logistics, which falls under the blanket of GSCM, is also a relatively new initiative that is used as a tool to drive sustainability within the industry, according to Hussain et al. (2023). Although several studies, such as by Kaur and Awasthi (2018), Prataviera et al. (2023) and Tumpa et al. (2019), have been conducted to determine the barriers impacting green logistics, there is limited research on the factors that affect green logistics initiatives within pharmaceutical industries in South Africa. The pharmaceutical industry plays a pivotal role in South Africa, as noted earlier, due to the need for medication to combat epidemics such as tuberculosis, diabetes, COVID-19, HIV and AIDS (Herrmann et al., 2021; Ma'aruf et al., 2023; Zheng et al., 2020). Pharmaceutical companies also produce high levels of hazardous waste and have a substantial impact on the environment, play a crucial role in communities and impact the economy substantially (D'Sa and Patnaik, 2020; Kumar et al., 2023; Meena and Singh, 2020; Sharma and Tiley, 2021). Therefore, pharmaceutical companies have a direct impact on sustainability in South Africa. Kitsis and Chen (2021) state that GSCM is critical to developing a sustainable organisation, especially since it affects both environmental and social sustainability.

The above discussion realises the importance of the need for research in GSCM, especially in a niche industry such as pharmaceuticals. Many of the articles published focus on developed countries and very few on developing countries, and even fewer on South Africa. Therefore, the research provided through this study will not only contribute to the existing body of knowledge but also delve deeper into a South African understanding of the problem. The research questions identified to guide the research are:

(a) What are the current logistics processes at CIPLA Medpro Manufacturing, and to what extent do they embrace GSCM practices?

(b) What are the staff profiles who work in the logistics division at CIPLA Medpro Manufacturing?
(c) What are staff perceptions on sustainability, with specific reference to GSCM?
(d) What sustainable initiatives is CIPLA Medpro Manufacturing implementing, specifically in relation to green logistics?
(e) What are the external barriers affecting green logistics at CIPLA Medpro Manufacturing?
(f) What are the internal barriers that are affecting the Logistics Department at CIPLA Medpro Manufacturing?
(g) What countermeasures do CIPLA Medpro Manufacturing have in place to combat these barriers?

1.3 Aim and objectives

1.3.1 Aim

The overall aim of this research is to critically examine the barriers affecting green logistics in the South African pharmaceutical industry by using the case study at CIPLA Medpro Manufacturing.

1.3.2 Objectives

This study has the following objectives:

(a) To assess the current logistics processes at CIPLA Medpro Manufacturing in relation to GSCM practices;
(b) To examine the staff perceptions and attitudes towards climate change and environmental strategies generally and at CIPLA Medpro Manufacturing specifically;
(c) To assess the external barriers affecting the implementation of green logistics at Medpro Manufacturing;
(d) To assess the internal barriers affecting the implementation of green logistics at CIPLA Medpro Manufacturing;
(e) To evaluate whether CIPLA Medpro Manufacturing has countermeasures in place to combat barriers and, if so, the effectiveness of these measures; and
(f) To forward recommendations for improved green logistics at CIPLA Medpro Manufacturing based on research findings.

1.4 Overview of Conceptual/Theoretical Framework

The term sustainability originated from the Brundtland report of 1987 by the World Commission on Environmental Development (Brundtland, 1987). Hermundsdottir and Aspelund (2021), Ofori et al. (2023) and Singh et al. (2022) identify the causes of environmental degradation by exploring the interconnections between social equity, economic growth and environmental problems and further went on to develop policy solutions that integrated all three areas. Ranjbari et al. (2021) further emphasise this by stating that these pillars interrelate to give a holistic view of sustainability in both corporate and social settings. The term sustainability was developed to focus on issues of critical importance facing the longevity of the world's ecosystem, social structures and corporate social responsibility (Freze et al., 2023).

In terms of the conceptual and theoretical approach used for the study, the sustainability model focuses on the three pillars of sustainability (environmental, societal and economic), as noted by Álvarez-Herranz and Macedo-Ruíz (2021), Gomes Silva et al. (2022) and Ranjbari et al. (2021) that frame the research. Huttmanová and Valentiny (2019) argue that the social, environmental and economic pillars of sustainable development are intimately interrelated and cannot be considered separately. Hermundsdottir and Aspelund (2021) argue that the three pillars exist due to the problems that arise in each respectively.

In relation to the societal pillar of sustainability, Purvis et al. (2018: 4) state that "in order to meet this sustainable pillar a business should have the support and approval of its employees, stakeholders and the community it operates within" and "to gain the support of its employees an organisation will have to develop relationships through initiatives such as the focus on employee retention and development, better employment benefits and treating employees fairly overall". For community support, companies will have to engage with the community through initiatives such as investment in public projects, scholarships and sponsorships. According to Thomas et al. (2021), societal expectations are not met due to issues such as high unemployment, poor working conditions, social vulnerability, the poverty trap, intergenerational equity and widening inequalities.

In relation to the economic pillar of sustainability, Gomez and Crowther (2022) postulate that to be economically sustainable, a business will need to ensure that it earns a profit and can operate for the foreseeable future. However, Purvis et al. (2018) argue that this pillar should never be in contradiction with the previous two pillars and that the activities of this pillar include compliance, proper governance and risk management. Banerjee and Roy (2023) state that some of the economic challenges, such as supply risk, problematic ownership structures, deregulated markets and flawed incentive structures, lead to increasingly frequent financial and economic instabilities for individual companies and entire economies.

The environmental pillar of sustainability focuses on the well-being of the planet and ensures that the limited resources available on Earth are used in a way that is responsible for future generations. Environmental sustainability can be broken down as the rates of renewable resource harvest, pollution creation and non-renewable resource depletion that can be continued indefinitely (Jie et al., 2023). If these aspects cannot be continued indefinitely, then they are not sustainable. Mohaghegh et al. (2021) state that early models of sustainability focused solely on the environmental pillar and basic practices at an organisational level of pollution prevention and eco-efficiency through to advanced practices, including redesigning supply chain processes around environmental goals and the reuse or recycling of materials and resources throughout the organisation. Thomas et al. (2021) argue that some of the impacts of poor environmental sustainability are the increasing evidence of global environmental risks, such as ozone depletion, climate change, biodiversity loss and the alteration of the nitrogen cycle.

More recently, an overarching aspect integrated into the framework that highlights the interrelated three pillars is that of governance. According to Lin and Qamruzzaman (2023), corporate governance is a structure that ensures that decisions are made to determine long-term sustainability for organisations. Corporate governance is a concept that is used to oversee the three pillars of sustainability. The reasoning for this, as articulated by Shi et al. (2019: 11), is:

> Governance structures organise negotiation processes, determine objectives, influence motivations, set standards, perform allocation functions, monitor compliance, impose penalties, initiate and reduce conflict, and resolve disputes among actors.

Morita et al. (2020) suggest that effective governance through vertical and horizontal coordination among institutions and the promotion of good governance practices for sustainable development can overcome the difficulties faced by the three pillars of sustainability. Enciso-Alfaro and García-Sánchez (2023) further emphasise that corporate governance is highly influential on an organisation’s performance in sustainability as it affects an organisation's strategy and principles. These principles are transparency, accountability, fairness and responsibility.

Epstein et al. (2018: 21) identify the importance of incorporating sustainability into operations:

> Sustainability cannot be managed as just a public relations strategy to pacify stakeholder concerns. Doing so can be quite risky as stakeholders expect actions and results to be consistent with rhetoric. Furthermore, it is only through the identification, measurement, and management of sustainability impacts that social and environmental and financial performance can be improved and value created. For sustainability to be valuable to both the organisation and its stakeholders, it must be integrated into the way a company does business.

Efficient governance in corporations such as those that operate within the pharmaceutical sector should include sustainability in supply chain management to promote sustainable development. An element of this study aims to identify the structures within CIPLA Medpro Manufacturing to determine the impact of corporate governance as a factor contributing to the successful adoption/ implementation of green logistics. This is to explore the impact of external and internal barriers affecting green logistics at CIPLA Medpro Manufacturing to determine the validity and applicability of previous literature on the factors impacting green logistics in the pharmaceutical industry in South Africa.

1.4.1 Overview of the pharmaceutical industry globally and in South Africa

The pharmaceutical industry can be defined as the complex flow of operations involved with the manufacturing and distribution of drugs and medicines (de la Torre and Albericio, 2021; Khan et al., 2021; Sharabati, 2021). According to de la Torre and Albericio (2021), the pharmaceutical industry can be defined as the production, transportation and consumption of medicines. The pharmaceutical industry can also be defined as the discovery, manufacturing and distribution of medicines (Milanesi et al., 2020). According to Sood et al. (2021), the pharmaceutical industry is a high-risk industry, but it has one of the highest profits of any other industry. According to the Fortune 500 list, in the United States of America, the top 10 pharmaceutical companies made a larger annual profit than the other 490 companies in various sectors combined. The reason the pharmaceutical industry is high-risk is a result of the large number of factors that influence it (Kumar et al., 2019).

The pharmaceutical industry in South Africa contributed 1.58% of South Africa's total gross domestic product (GDP) in the 2008/2009 financial year; this was total revenue of R36,1 billion (Arndt et al., 2020). South Africa's healthcare industry is divided into the private and public sectors. Around 16% of South Africa's population, which is approximately 7 million people, get their health care from the private sector, whilst the remaining 84%, which is around 42 million people, get their health care from the public sector (Moonasar et al., 2021). South Africans spend approximately 1.9% of their household expenditure on pharmaceutical and medical products (Arndt et al., 2020). Pharmaceutical companies in South Africa cater to the needs of both the public and private sectors.

Supply chains operate in all businesses and encompass operations such as the procurement, storage and movement of goods and services, to name a few (Barbosa-Povoa and Pinto, 2020). A pharmaceutical supply chain is an unusual supply chain because it is unique and more complex than supply chains in other industries (Kocabasoglu-Hillmer et al., 2023). This uniqueness and complexity are created by the constantly changing operational and competitive environment in which the pharmaceutical industry operates (Sharabati, 2021). Pharmaceutical supply chains face factors such as high research and development investment, long manufacturing times, tough quality constraints and high waste generation, which also influence the reverse logistics cost (Barbosa-Povoa and Pinto, 2020). As a result, pharmaceutical supply chains are more difficult, making initiatives such as GSCM more costly and time-consuming.

1.4.2 Impact of logistics on the environment

The logistics department of an organisation is involved with the movement of goods both upstream and downstream from the supplier of raw materials to the end consumer (Ren et al., 2020). According to to Du et al. (2023), Nikseresht et al. (2023), Rodrigue et al. (2017), and Rosano et al. (2022), logistics contributes significantly towards environmental degradation as it encompasses core business operations such as transportation, storage and reverse logistics including waste disposal. Some of the most significant impacts of logistics operations are the damage to the environment through pollution and depletion of natural resources, according to Chen et al. (2023).

The impact of supply chains and, subsequently, the logistics department on the environment is also determined by the type of industry in which the organisation is operating, as noted by Sharma et al. (2020). Everson et al. (2023) highlight that pharmaceutical supply chains are more complex than most other supply chains due to the type of product and ingredients that are used in the production process. The pharmaceutical ingredients that are used in the manufacturing of pharmaceutical products are not often easily available and require shipping across long distances to production facilities (Everson et al., 2023). According to Sheldon (2018) and Suhandi and Chen (2023), these ingredients also significantly impact the environment such as soil contamination, habitat destruction, toxic effects of pharmaceutical products on wildlife and biomagnification through the uptake of pharmaceuticals into food crops. In the case of CIPLA Medpro Manufacturing, active pharmaceutical ingredients such as Amlodipine, Granisetron and Zidovudine are used in the production of their products. According to Vieira-Sellaï et al. (2022), these products should be properly disposed of or recycled as they can cause serious ecological environmental damage if they are released into natural water systems.

1.4.3 GSCM initiatives in the pharmaceutical industry

The greening of a supply chain means making it more sustainable for both the environment and society. Simm (2021) states that the greening of logistics and freight transportation operations involves the incorporation of environmental measures when designing logistics and distribution networks, whilst underpinning transportation and warehousing operations. The pharmaceutical industry relies strongly on the Logistics Department; as a result, these processes are critical to pharmaceutical companies (Barbosa-Povoa and Pinto, 2020). The most important logistical processes have been identified as reverse logistics and green transportation and distribution (Simm, 2021).

Reverse logistics is the backward movement of waste and products into the company for reuse or disposal (Butar and Yamin, 2023). Pharmaceuticals generally consist of high-value chemicals that require proper reverse logistics management, especially expired and recalled stock (Makaleng and Lambert, 2022). This is because the chemicals used in medication can be highly destructive to the environment if they are exposed to water systems such as rivers (Khan et al., 2021). The pharmaceutical industry has a high wastage-to-product ratio and, therefore, requires efficient reverse logistics systems (Barbosa-Povoa and Pinto, 2020). Reverse logistics can be used to minimise or mitigate the damage done to the environment by waste and expired pharmaceutical products (Oliveira et al., 2023).

Green transportation and distribution is the use of environmentally-friendly transportation or methods of transportation that have a reduced impact on the environment than standard transport methods (Mell and Whitten, 2021). The over-utilisation of road freight causes high levels of pollution through air and noise (Lutman and Strojan, 2023). The movement toward environmentally-friendly fuels and other more efficient methods of transport can be identified as green transport and distribution initiatives (Shamsuddoha et al., 2023). Green transportation and distribution reduce organisations' and products' overall carbon footprint, which improves environmental performance (Mell and Whitten, 2021).

The factors that affect GSCM have been separated into two groups, namely internal and external factors. According to Hebaz and Oulfarsi (2021), the segregation between these two types of factors is to distinguish which elements can be controlled by the organisation and those that cannot. Internal factors can be managed internally to change the impact on GSCM initiatives, whereas external factors cannot be controlled, which limits the organisation's ability to manage these factors (du Plooy et al., 2022). These two groups have been identified as the key factors that affect GSCM initiatives by du Plooy et al. (2022), Hebaz and Oulfarsi (2021) and Yassin et al. (2021).

External factors are factors that operate outside the boundaries of a business but still have an impact on business initiatives such as GSCM initiatives. Some of the most prominent literature on these barriers have identified suppliers, government and policy regulation, consumers, competitors, social trends, inbound logistics and outbound logistics as external barriers (Asamoah et al., 2023; Albhirat et al., 2023; El-Garaihy et al., 2022; Habib et al., 2021; Khaghani Zadeh et al., 2021; Kumar et al., 2019; Novitasari and Agustia, 2021; Shin and Cho, 2022; Taghavi et al., 2021). These factors vary between industries and countries, with some of the most common external barriers being government policies and the state of the global economy, as these elements impact businesses universally (El-Garaihy et al., 2022).

Although external factors generally cannot be controlled by organisations, the effects of their existence can be controlled through the use of business strategies and risk management plans (Habib et al., 2021). This suggests that although external factors are naturally occurring phenomena, they can, to some degree, be managed by businesses (Mahmood et al., 2023). According to Shin and Cho (2022), if these external barriers to GSCM can be detected and their impact quantified, then they can be managed through the use of countermeasures. This would allow businesses to improve the performance and success rate of GSCM initiatives. Therefore, the identification of these factors is pivotal to the successful implementation and adoption of GSCM initiatives by businesses.

Internal factors are factors that operate within a business' boundaries and affect initiatives such as GSCM initiatives. According to Shin and Cho (2022), these factors differ from external factors as they can directly be controlled by the organisation using several techniques and strategies. This is supported by El-Garaihy et al. (2021), who suggest that internal factors fall within the jurisdiction of the organisation as they can control the impact of these factors. This highlights the importance of understanding these factors and their impact on GSCM so that business strategies and sustainable initiatives can be developed with the consideration of these elements.

Some of the internal factors impacting GSCM have been identified as management support and commitment, organisational structure and strategy, cost, reverse logistics, eco-design, investment recovery and organisational learning (El-Garaihy et al., 2021; Ha et al., 2021; Hermundsdottir and Aspelund, 2021; Jum'a et al., 2022; Mughal et al., 2023; Shin and Cho, 2022; Tarigan et al., 2021). However, this does not limit the internal barriers to the above-mentioned but rather provides a foundation for further exploration of these factors. The identification of internal factors impacting GSCM is crucial to assist management in the planning of their sustainable strategy. According to Hermundsdottir and Aspelund (2021), the identification of high-impact factors can be greatly beneficial to an organisation as it would allow them to prioritise countermeasures and strategies to mitigate and reduce the effect of these factors on the success of GSCM initiatives. This would also assist organisations in prioritising their investment in high-priority factors as opposed to low-priority factors (Sharma and Joshi, 2023).

1.5 Research Methods and Data Sources

1.5.1 Research overview

A case study approach has been selected for this study. This is an approach to research that facilitates the exploration of a phenomenon within its context using a variety of data sources

(Bouncken et al., 2021). According to Hancock et al. (2021), case study research methods allow researchers to capture multiple realities that are not easily quantifiable. This type of research approach differs from other methods because of its holistic approach to information collection in natural settings and its use of purposive sampling techniques (McBeath et al., 2023). Wohlin (2021: 133) further emphasises this by stating that a case study is:

> …a contemporary phenomenon within its real-life context, especially when the boundaries between a phenomenon and context are not clear and the researcher has little control over the phenomenon and context.

Lenart-Gansiniec et al. (2023) identify the benefits of a case study as being flexible because of their ability to develop ideas for more extensive research in the future and their ability to capture reality. Monson (2021), Nayak and Singh (2021) and Treiblmaier (2020) emphasise the importance of case studies by stating that they are capable of creating in-depth descriptions and rich understandings of social contexts that have relevance and resonance across social sites. This motivates the use of this type of study to achieve the research objectives set by the researcher. Using this methodology, the researcher can explore the various barriers impacting GSCM through the analysis of the actual phenomena and immersion in practical situations.

1.5.2 Background of CIPLA

CIPLA Medpro Manufacturing, which is 100%-owned by CIPLA India, is one of the country's leading pharmaceutical companies that produce world-class medicines at affordable prices (CIPLA, 2022). CIPLA was founded in Mumbai, India, in 1935 and was originally known as Chemical, Industry and Pharmaceutical Laboratories (CIPLA, 2022). In 1984, the company changed its name to CIPLA and continued to contribute significantly towards the pharmaceutical sector, such as launching the world's first oral iron chelator (CIPLA, 2022). CIPLA has been in operation for over eight decades and is one of the leading global pharmaceutical companies dedicated to developing branded and generic medicines (CIPLA, 2022). CIPLA has forty-seven manufacturing sites across the world and sells its products in over eighty countries worldwide. CIPLA Medpro Manufacturing was a distribution partner of CIPLA India and was formally known as Enaleni Pharmaceuticals Limited, which was established in 2002. In 2013 CIPLA acquired CIPLA-Medpro Manufacturing. Today the company is one of the largest pharmaceutical companies in South Africa by volume and third-largest by value (CIPLA, 2022). CIPLA has over 1 500 products in their portfolio in more than fifty dosage forms that range from antivirals, analgesics, antipyretics, antacids, nutritional supplements, vitamins, antihistamines and anti-emetics to name a few (CIPLA, 2022). Some of the most popular medications produced by CIPLA globally are Cofsils, Ciphands and Nicotex (CIPLA, 2022). CIPLA states that they are focused on delivering a long-term sustainable business and recognises its duty to provide affordable medicines (CIPLA, 2022). CIPLA's emphasis on access for patients was recognised globally for the pioneering role played in HIV and AIDS treatment as the first pharmaceutical company to provide a triple combination antiretroviral (ARV) in Africa at less than a dollar a day thereby treating many millions of patients since 2001 (CIPLA, 2022). CIPLA has a workforce of over 25 000 employees worldwide and 238 employees in South Africa (CIPLA, 2022). CIPLA is also involved in a number of corporate social responsibility initiatives such as the palliation project, the respiratory care support programme, vocational training for disadvantaged individuals, scholarships for disadvantaged students, community enrichment programmes and disaster relief support. Given CIPLA's prominent standing in the global pharmaceutical industry and, more importantly, in South Africa, it would meet all the proposed objectives of the study. CIPLA has been in operation for a long period of time, their knowledge and experience on the issues pertaining to sustainability, with a focus on the barriers to green logistics, would provide critical insights. They have also stated their focus on sustainability, which is a key focus of this study.

1.5.3 Research approach

This study used a mixed-methods approach. The researcher used a variety of data collection tools to obtain data to address the objectives of the study. A mixed-method approach to research means conducting both qualitative and quantitative research (Dousin et al., 2021; Ju and Stewart, 2023; Ryu, 2020). Mixed methods research is a systematic integration of quantitative and qualitative methods in a single study for the purposes of obtaining a fuller picture and deeper understanding of a phenomenon (Birgili and Demir, 2022; McCrudden and Marchand, 2020; Mohammadi et al., 2021). Birgili and Demir (2022) highlight the importance of the mixed methods approach by stating that the purpose of this form of research is that both qualitative and quantitative research, in combination, provide a better understanding of a research problem or issue than either research approach alone.

The key data collection techniques used were surveys and a key informant interview. A combination of face-to-face, online and telephonic modes of communication was used in the study. The survey (Appendix 1) and key informant interview (Appendix 2) were conducted in English. This was administered by the researcher through the use of printed surveys, which were based on the respondents' preferences. It is important to note that this study was conducted during the COVID-19 pandemic, therefore, testing methods were modified to ensure the safety of both the researcher and respondents.

The study also consisted of a key informant interview with the manager to help with process mapping and determining the sustainable practices at CIPLA Medpro Manufacturing for background information on their green initiatives and process mapping. This key informant interview complemented the quantitative surveys, and the key informant was purposively chosen, as detailed later. The key informant interview was conducted via Zoom (based on the respondent's preference). This replaced the conventional face-to-face method to protect the researcher and respondent from any possible spread of the COVID-19 infection.

All respondents in this study (survey respondents and the key informant) were provided with a consent letter prior to responding, which is attached as Appendix 3. The motivation for the use of a consent form is to ensure that all respondents are aware of the purpose of the study and to protect them from poor research practices. It was confirmed by CIPLA Medpro Manufacturing human resource staff that all logistics staff members are proficient in English, and thus verifies that all respondents in this study understood the questions put forth by the researcher within the data collection instruments.

The data generated from the quantitative surveys were statistically examined using descriptive approaches. The researcher determined that using a data analysis software package, the Statistical Package for the Social Sciences (SPSS), would be best suited for analysing of the quantitative results. Furthermore, the findings from the key informant interview were thematically integrated into the analysis. The researcher used the information provided by the key informant to identify themes and probe deeper into the phenomena whilst identifying patterns between the quantitative data. This also allowed the researcher to gain deeper insights into themes identified within the quantitative research.

The key informant interview was scribed by the researcher after the respondent declined the request to record the session. This facilitated the respondent's requirements whilst allowing the researcher to extrapolate the required information to answer the research questions put forth without reaching an impasse. The sample size for the key informant interview was one individual. The candidate chosen was the Warehouse Manager. The researcher purposively selected this individual due to the depth of their knowledge of the organisation and its practices. The recruitment was discussed with the public relations department to request authorisation from the respondent. The purpose of this interview was to map the green logistics processes within the supply chain. This provided deeper insight into the green initiatives that were conducted at CIPLA Medpro Manufacturing.

1.6 Study scope

As noted in this study, CIPLA Medpro Manufacturing is used as a case study to examine the barriers affecting green logistics in the South African pharmaceutical industry. This is particularly important in the identification of the factors that negatively impact green logistics adoption and maintenance within the pharmaceutical sector, especially in a South African context. As mentioned earlier, this gap creates the need for research on the barriers to green logistics within the pharmaceutical industry in South Africa.

1.7 Chapter Sequence

Chapter 1: Orientation of the Study

The introductory Chapter presents the background to the study by highlighting the importance of sustainability, which gave rise to the need for green initiatives. Contextual meanings of the main concepts guiding the research, such as GSCM, sustainability, logistics, climate change and pharmaceutical supply chains, are briefly provided. The Chapter highlights the significance of the study, giving an overview of the pharmaceutical industry and the importance of sustainability for this industry. The aim, objectives, scope and limitations of the research are outlined as well. Generally, the Chapter gives the scope and focus of the research.

Chapter 2: Theoretical and Conceptual Framework of the Research

The theoretical and conceptual framework provides the foundation for the study through the use of appropriate literature. The literature identified in the conceptual framework is the theories that the researcher has used to develop the study. Insights provided are those that are relevant to the study, accompanied by the researcher's rationale behind the choice of literature.

Chapter 3: Literature Review

The literature review provides insight into the literature that acts as a foundation for the study. The core of the literature review concentrates on the three pillars that the study focuses on, namely, sustainability, supply chain management and the pharmaceutical industry. The pillars are then expanded on to give a holistic view of the topic and its relevance.

Chapter 4: Research Methodology

In this Chapter, the methodology and approach followed by the researcher are discussed in detail to provide insight into the research approach, study site, population and data collection techniques. This Chapter concludes with a discussion on measures used to ensure the validity and reliability of the study as well as ethical considerations followed by the researcher.

Chapter 5: Results Presentation, Analysis and Discussion

In this Chapter, the data that was gathered during the data collection stage is transformed into meaningful information and then analysed to provide insights into the phenomena and answers to the research questions put forth. The tabulation and analysis of results are discussed in this Chapter and potential themes, concerns and relationships are identified. Primary data responses were analysed by the researcher and compared to the literature to identify recurring themes and new insights into the discipline.

Chapter 6: Summary, Recommendations and Conclusion

This Chapter concludes the study with a review of the findings and the provision of recommendations to CIPLA Medpro Manufacturing on methods to counter the factors impacting GSCM and green logistics within the organisation. The researcher provides suggestions in relation to relevant literature to provide concise remedies and practical suggestions to improve the adoption and maintenance of GSCM and green logistics initiatives at CIPLA Medpro Manufacturing. A summary of the findings is also presented to highlight key themes and to conclude the study.

1.7 Conclusion

The orientation to the study provided in this Chapter provides the general background and an outline of the factors that affect GSCM initiatives such as green logistics. The three pillars of sustainability and their interrelation with one another are also briefly discussed. The lack of research on the topic in South Africa and the importance of the study are also highlighted in this Chapter. An overview of the topic, theoretical framework and methodology adopted is also provided. Key aspects such as the aim, objectives, scope and limitations of the research are outlined.

CHAPTER TWO: THEORETICAL AND CONCEPTUAL FRAMEWORK OF THE RESEARCH

2.1 Introduction

The foundation of this study rests on key concepts and theories identified by the researcher. This Chapter highlights each of these founding concepts to develop an understanding of the study by putting each theory into perspective. Once each concept is explained, a holistic picture of the study and the underlying problem surfaces. The theoretical and conceptual framework creates the backbone of the study, and the literature and theories put forward serve as the basic foundation on which the study is built. A basic concept overview has been created to give structure to the Chapter and identify the flow followed by the researcher. Figure 2.1 identifies the Chapter flow and theoretical links that the researcher has made for the study. The sustainable development theory forms the foundation of this study as it highlights the need for sustainable development initiatives within the industry. The green logistics theory identifies the role that GSCM and green logistics fulfil in the promotion of sustainable development and serves as a connector between business goals and sustainable development. The risk identification theory and stakeholder theory are used to highlight the importance of risk identification in the success of green logistics initiatives and the importance of internal stakeholders in the risk identification process.

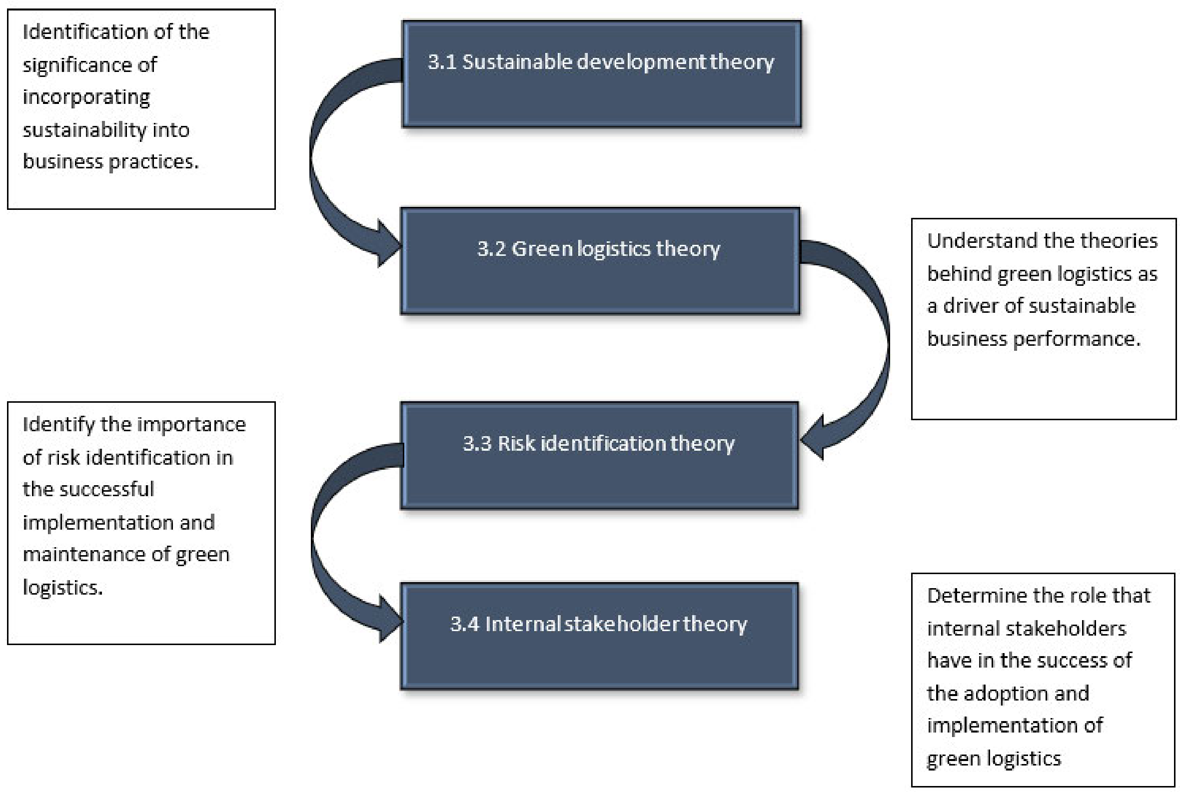


Figure 2.1: Theoretical Overview

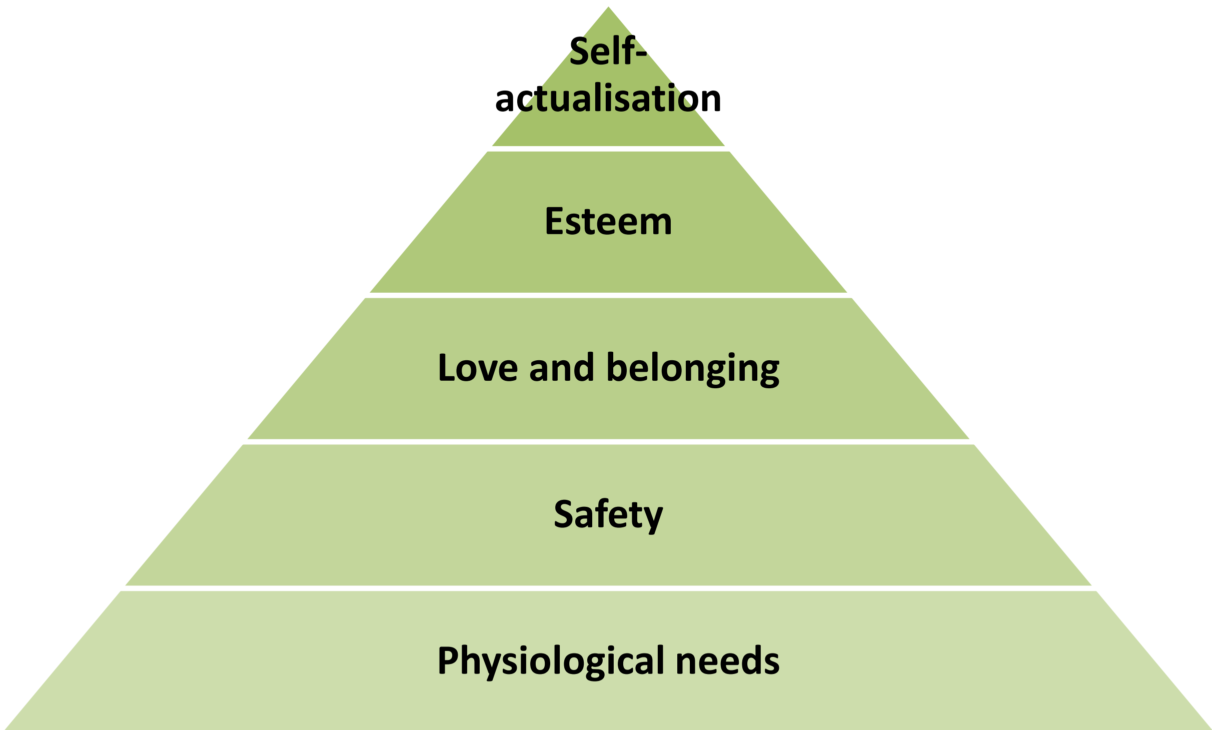
2.2 Sustainable development theory

The theory of sustainable development is adopted as the first element of the theoretical framework for this study, as it validates the need for a change towards sustainable behaviour within organisations. Pizzi et al. (2020) suggest that sustainable development is a theory that is widely analysed by organisational policymakers in recent years to combat social, environmental and economic challenges that impact organisations. Silva (2021) identifies that the theory of sustainable development originated from the Sustainable Development Goals set by the United Nations. Keser (2023) and Mensah (2019) argue that the theory of sustainable development has gained popularity over the years and is a term that is used to initiate contemporary organisational development discourse. According to Jan et al. (2023) and Ruggerio (2021), there are a number of definitions that are used to describe sustainable development, and these definitions are closely aligned with environmental, financial and social performance. Hermundsdottir and Aspelund (2021) suggest that sustainable development was developed to focus on issues of critical importance that impact the longevity of the world's ecosystem, social structures and corporate social responsibility. Chams and García-Blandón

(2019) posit that the drive towards sustainable development is driven by ethical, social and ecological objectives. Diab and Nasr (2023) concur with Chams and García-Blandón (2019) by stating that organisations align themselves with Sustainable Development Goals, which gravitate around the betterment of economic, environmental and social practices. Organisations are now focusing on new goals that are aligned with individual, communal and environmental performance whilst achieving financial profit (Jones-Khosla and Gomes, 2023). According to Geissdoerfer et al. (2018), the theory of sustainable development is mandatory in light of the prevalence of growing inequality, economic disruptions and the deterioration of natural resources and natural life support systems. Silva (2021) suggests that reaching Sustainable Development Goals by 2030 through green practices and organisational transformation is vital for the well-being of humanity and the planet.

Rodriguez (2021) suggests that the theory of sustainable development focuses on achieving harmony and balance between socio-political sustainability, economic sustainability and environmental sustainability. According to Rani and Rani (2019), the theory of sustainable development is an evolving theory that develops continuously as new environmental, social and economic risks arise. According to Sachs et al. (2021), the drive towards sustainable development is a necessity due to the decline of the environment, the growing vulnerability in social systems and the need for better economic performance. Litvaj et al. (2023) suggest that organisations need to adopt the sustainable development theory as it focuses on building and developing a strong and competitive economy. According to Silvestre and Ţîrcă (2019), this theory is achieved through the innovation of business practices and the development of new practices that drive the performance of an organisation whilst considering the impact that it has on the environment. Bondarenko et al. (2023) state that sustainable development is pivotal in establishing a green economy that is both competitive and environmentally responsible. Guo et al. (2023b) state that sustainable development is pivotal to economic success in the face of diminishing natural resources and tightening constraints on organisations in the form of government policies. According to Fatimah et al. (2020), the transition into Industry 4.0 has made it evident that sustainable development is essential for the future of the world economy and industry. Sahoo et al. (2023) suggest that for the development of organisations in the fourth industrial revolution to be a success, it is necessary to establish new innovative techniques to improve both business and environmental performance. Fatimah et al. (2020) state that many prominent challenges that have arisen within the industrial and business sectors are directly linked to Sustainable Development Goals, such as stakeholder satisfaction, resource scarcity, the impacts of pollution on business performance and the collapse of waste management systems.

According to Cui et al. (2021), there is a direct correlation between sustainable development and the theory of Maslow's hierarchy of needs, which becomes more apparent in developing countries. Bamidele and Erameh (2023) indicate that individuals only take notice of the impact of environmental and social degradation when basic needs have been satisfied, especially in developing countries. Tetteh et al. (2023) argue that many organisations only realise the importance of sustainable development when there are external pressures from society and the government. Thus, the theory of Maslow's hierarchy of needs is relevant to this study and themes relating to the model will be prevalent in respondents' responses. Figure 2.2 represents the elements of Maslow's hierarchy of needs. According to Figure 2.2, physiological needs are the most essential, which is the motivation behind them forming the base of the pyramid. This is then followed by the less essential needs, which move higher up the pyramid that highlight the level of priority that each need has for humans.



Source: Hopper (2020: 3)

Figure 2.2: Maslow's hierarchy of needs

According to Hopper (2020), Pawsey et al. (2023) and Yurdakul and Arar (2023), Maslow's hierarchy of needs focuses on five fundamental desires of human beings: physiological, safety, love and belonging, esteem and self-actualisation. The basic or most important desires are at the lowest level of the pyramid depicted in Figure 2.2 and move up to the less essential human desires. According to Melnyk et al. (2023), physiological needs are the basis of the hierarchy of needs because human beings cannot live without these elements. These elements are air, food, water, shelter and homeostasis (Melnyk et al., 2023). According to Anuya et al. (2023), security and safety form the second level as it provides an individual with the ability to sustain themselves for the foreseeable future. According to Chen et al. (2022), financial security is essential as it allows an individual the ability to acquire needs, which are directly related to health and safety. This is achieved through acquiring a currency that can be used to trade for these needs, which in current times, is money (Chen et al., 2022). According to Alemayehu et al. (2023) and Alharthi et al. (2022), good health and safety are also conducive to ensuring that a human being can sustain themselves and is critical to the quality of life experienced by an individual. Yurdakul and Arar (2023) state that once these elements have been met an individual moves into the next stage of the hierarchy, which is social needs, such as becoming a part of a community and building relationships. This stage improves the mental state of an individual and creates a level of belonging (Yurdakul and Arar, 2023). According to Pawsey et al. (2023), if social needs have been met, individuals begin to focus on their personal esteem, which drives innovation and the need for development. This can be achieved through appreciation and respect for oneself, the community, and the greater society at large (Pawsey et al., 2023). Hopper (2020) states that the final stage of Maslow's hierarchy is when an individual reaches a level of self-actualisation and begins to fully explore their personal skills and talents, which drives long-term social sustainability. Hale et al. (2019) suggest that only when an individual reaches a certain level within the hierarchy, their focus on sustainable and external developmental efforts will start to develop. Hopper (2020) suggests that this occurs after the stage of love and belonging as an individual has the most basic needs satisfied and can start to look outwards. Table 2.1 gives a brief breakdown of each of the elements within the stages of Maslow's hierarchy of needs.

Table 2.1: Elements of Maslow’s hierarchy of needs

Stage	**Elements**
Physiological needs	• Food • Water • Shelter • Breathing • Homeostasis
Security and safety needs	• Financial security • Health and wellness • Safety against accidents and injury
Social needs	• Friendships • Romantic attachments • Family • Social groups • Community groups • Churches and religious organisations
Esteem needs	• Appreciation • Respect
Self-actualisation needs	• Full use and exploitation of talents, capabilities, and potentialities

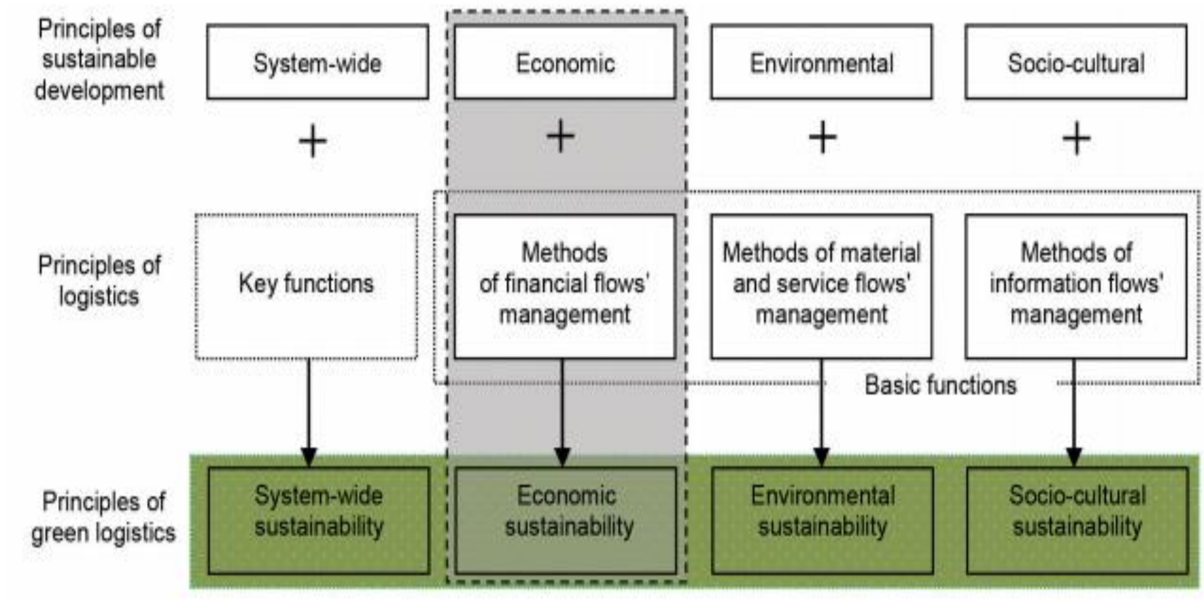
Source: Adapted from Cherry (2021)

According to van Zanten and van Tulder (2021), humans are dependent on the Earth's support systems that have a limited capacity, which is the driving force of the theory of sustainability. Sustainability in practice improves resource utilisation, which in turn allows for the Earth's resources to be maintained or at least reduces the speed of the Earth's degradation (Zanten and van Tulder, 2021). Schlüter et al. (2023) identify that in light of the constraints facing the world, businesses have opted to transform their business models to incorporate sustainability orientated practices. According to Yong et al. (2020), businesses are required to transform their processes to incorporate the theory of sustainability to manage the risks that face modern-day organisations. Du et al. (2023) argue that sustainable development is crucial in maintaining a balance between the consumption of resources by humanity and ensuring that the Earth's natural systems are protected. This balance can only be created through a circular economy by developing business practices that focus on Sustainable Development Goals (Puntillo, 2023). Zhongming et al. (2020) identify that if industries do not limit their use of non-renewable resources and reduce the pollution created by operations, the Earth's support systems will collapse, causing widespread destruction to both the environment and human health. Usman et al. (2022) suggest that the change to align business processes to promote the sustainable development theory should be mandatory due to the current state of the climate and the degradation of the Earth's support systems. The researcher adopts the theory of sustainable development within this study as it highlights the need for a change of business practices to ensure that the Earth’s limited resources must be used more responsibly whilst driving economic growth. This perception supports both the ideal of the protection of the environment and humanity and shows the importance of implementing sustainable development initiatives within organisations.

2.3 Green logistics theory

According to Tan et al. (2020), the theory of green logistics is that it is a core practice in the implementation of sustainable development from an organisational operations perspective as it converts critical business processes to be environmentally-friendly whilst ensuring that an organisation considers social concerns and economic sustainability. Khan et al. (2021) state that green logistics theory creates a bridge between business processes and the concept of sustainable development as it is a mechanism for the realisation of Sustainable Development Goals. Van Zanten and Van Tulder (2021) state that for sustainable development to achieve its purpose and full potential, it must be integrated into business processes and strategies. Yadav et al. (2023) indicate that Sustainable Development Goals are achieved through the adoption and development of environmentally-friendly techniques by an organisation's human resources. Pizzi et al. (2020) argue that for sustainable development to become a reality for many organisations, new strategies for old business processes need to be established in the form of sustainable initiatives. Tsalis et al. (2020) argue that the realisation of Sustainable Development Goals can only be achieved through the conversion of business processes, which are aligned with the desired sustainable outcomes. According to Siripipatthanakul et al. (2023), organisations are now moving towards establishing green human resource management teams, which focus on improving an organisation's environmental performance. These green teams are involved with driving environmental performance and environmental culture within an organisation (Siripipatthanakul et al., 2023). According to Grijalvo and García-Wang (2023), the need to develop green practices within an organisation is pivotal in establishing sustainable business models, as these initiatives are the necessary building blocks. Silva (2021) argues that to achieve Sustainable Development Goals, introducing green processes is essential, especially to transform a business process that generally has a significant impact on the environment, society and business performance. The inclusion of green performance measures, green training and green rewards is already becoming a prominent element in industries across the world to begin the transition (Siripipatthanakul et al., 2023).

Rasool et al. (2019) state that the movement and storage of materials and finished products are critical business processes that organisations are reliant on to get products to production plants and end-consumers. These logistical processes are a major contributor to environmental degradation through their by-products in the form of pollution and hazardous waste (Rasool et al., 2019). According to Albuquerque et al. (2020), almost 15% of energy-related carbon dioxide emissions come from the transportation sector, which comes from the burning of diesel and gasoline for the movement of products. Tian et al. (2018) suggest that the inclusion of warehousing and goods handling is likely to add around 2 to 3% to this total in the road transport sector. According to Agyabeng-Mensah (2020), logistics activities form a critical component of an organisation's activities, as a result, they consume large amounts of energy and emit substantial quantities of hazardous gases and waste. This has resulted in the rise of carbon emissions by 90% since the 1970s, and of this amount, 78% has been attributed to the burning of fossil fuels (Agyabeng-Mensah, 2020). Moriarty and Honnery (2019) identify that the amount of energy used to move freight is increasing at a faster rate than the energy consumed by cars and buses. Zhu et al. (2020) argue that if carbon dioxide emissions from shipping grow at their forecast rate while governments cut emissions from their national economies by an average of 50% by the middle of the century in line with current targets, shipping alone could account for 15 to 30% of total carbon dioxide emissions by 2050. According to Christodoulou et al. (2019), as a result of the risk posed by carbon emissions within the transport industry, governments and inter-governmental organisations are developing carbon abatement policies for the freight transport sector. Zhang et al. (2020) suggest that in an attempt to mitigate the risk posed by the adverse effects of logistics, “green logistics” was established. This green initiative is seen as the incorporation of sustainable practices into logistics planning and operations. According to Ju et al. (2023), the main aim of green logistics is to reduce the environmental externalities of logistics operations, such as greenhouse gas emissions, noise, and waste, and obtain balanced development among the economy, society, and the environment. Distinguishing from logistics, the main aim of which is to minimise cost, green logistics activities are motivated by environmental considerations (Ju et al., 2023). The introduction of green technology has had a positive effect on green logistics. Through the use of alternate fuel sources and low-emission transport methods, the impact of logistics on the environment has lessened. Anucha and Anaweokhai (2023) suggest that logistics has significant potential to improve the environmental performance of organisations through the use of recycling, reduction of environmental pollution and energy-saving processes. Figure 2.3 depicts how the principles of the contributing factors of green logistics correlate to form the principles of green logistics.



Source: Rakhmangulov et al. (2017: 51)

Figure 2.3: Green logistics as a driver of sustainable development

According to Al-Minhas et al. (2020), to achieve the principles of green logistics, an organisation must ensure that it integrates the principles of both logistics and sustainability. If an organisation is skewed towards either logistics or sustainability, then green logistics cannot be achieved successfully (Anucha and Anaweokhai, 2023). If an organisation focuses on logistics operations only, then it would neglect environmental concerns (Rakhmangulov et al., 2017). Doppelt and McDonough (2017) argue that if an organisation focuses excessively on sustainability, then it will not operate to its full capacity, which can result in poor organisational performance. This study recognises that the theory of green logistics as a driver for sustainable development is based on the motivation that logistics is not only a core business process but also a highly environmentally risky process. This illustrates the importance of the successful implementation and maintenance of green logistics initiatives in organisations.

2.4 Risk identification theory

According to Aslam and Ali (2020), risk identification is a crucial step in the planning and implementation stage of organisational initiatives and processes. Moeuf et al. (2020) state that the theory of risk identification is pivotal in determining the success of an initiative within a business by determining both internal and external factors. This theory focuses on improving the successful adoption and maintenance of new or current business processes and even business strategies by mitigating or eliminating the potential impact of negative factors through the use of countermeasures (Moeuf et al., 2020). Sun et al. (2023) suggest that the adoption of risk identification practices and theories with a business process is to establish an understanding of the potential barriers and hindering factors that could contribute to the failure of a project or initiative within a business. If barriers are identified, then the planning organisation can predict the success rate of an initiative or project, which would then provide insight as to whether it would be a viable investment for the organisation (Kliem and Ludin, 2019). Maina and Mungai (2023) state that the risk identification theory is translated into the risk assessment processes of an organisation, which is focused on improving the success rate of a project or process. Birkel et al. (2019) state that the theory of risk identification is the foundation of business strategies and operations in Industry 4.0 and is essential to the success of most business practices.

Joshi (2023) argues that risk identification is the basis for many business and supply chain-related operations and is, therefore, a prerequisite when making supply chain-related decisions. According to Bommasani et al. (2021), the most important element of the risk identification theory is to gather information about the potential risks that could impact an initiative from the various stakeholders and review past information on the implementation of similar initiatives. Buganova et al. (2021) suggest that the foundation for risk identification is the collection of data from relevant sources and the transformation of that information into meaningful data, which is then used to plan a course of action to mitigate or eliminate risks. El-Baz and Ruel (2021) concur by stating that risk identification and assessment are widely acknowledged by business practitioners and academics as the basis for the adoption and maintenance of organisational projects and initiatives. If this process of risk identification is not done correctly or if crucial information is omitted, then it is very likely that planning for countermeasures will be done inadequately, potentially resulting in the failure of the business initiative (Bommasani et al., 2021).

Westerlund and Taylor (2021) state that a core contributor to the failure of sustainable development initiatives is poor risk identification and mitigation practices. Ma and Wang (2023) argue that the most important role of the risk identification theory in the implementation of sustainable initiatives is that it is used to identify false investments by organisations. These are investments that do not achieve their purpose and often fail during their infancy due to various contributing factors (Ma and Wang, 2023). This then serves as a deterrent for future investments by organisations in sustainable development initiatives (Ma and Wang, 2023). Montiel et al. (2021) identify that externalities are a core determinant that impacts the success of sustainable practices and severely hinders the realisation of Sustainable Development Goals within an organisation. According to Pizzi et al. (2020), to incorporate successful sustainable development initiatives, an organisation needs to identify the internal and external factors that impact the success of these initiatives. A lack of understanding of these factors can negatively impact the possibility of the success of these sustainable initiatives (Pizzi et al., 2020). According to Liou et al. (2023), the act of adopting sustainable initiatives by organisations requires substantial motivation as it involves financial and resource investment. The decision to align business processes to Sustainable Development Goals, therefore, requires stakeholder support and a risk assessment which is associated with the risk identification theory (Liou et al., 2023). According to Maskrey et al. (2023) and Zouari-Hadiji (2023), a core component of risk management is awareness and knowledge management. Zouari-Hadiji (2023) states that knowledge management and awareness can mitigate potential risks, such as service continuity and reputational damage. Maskrey et al. (2023) highlight that awareness within an organisational context is critical to the success of operations as it indicates important areas of focus such as potential risks and opportunities. Ali et al. (2023) posit that awareness and knowledge management provide the foundation for risk management through the identification of proper implementation of processes and the recognition of failing processes. The purpose of the risk identification theory in this study is to recognise the threat that unquantified risks pose to the success of sustainable development initiatives and illustrate the importance of accurately identifying barriers and threats to the adoption of green logistics initiatives at CIPLA Medpro Manufacturing.

2.5 Internal stakeholder theory

Carroll and Brown (2022) state that there are two types of stakeholders in an organisation, which are classified as internal and external stakeholders. Internal stakeholders are individuals who have a direct interest in an organisation through either ownership, investment or employment, whilst external stakeholders do not work directly with the organisation (Carroll and Brown, 2022). According to Stahl et al. (2020), internal stakeholder theory focuses on the stakeholders that have a direct interest in the organisation under the premise that they are the custodians of the implementation and maintenance of business processes and, therefore, are the most important stakeholders with regard to the adoption of new business strategies and practices. According to Stocker et al. (2020), the internal stakeholder theory suggests that for business initiatives and strategies to be a success, it requires the support of the internal stakeholders of an organisation. Yanez et al. (2019) state that internal stakeholder theory highlights the importance of an organisation's collaboration with its employees and investors and provides a bridge between business strategies and operations execution.

Freudenreich et al. (2020) state that business models and frameworks are heavily guided by an organisation's stakeholders, whether it is in the form of actual investors supporting business strategies or employees physically conducting a business process to support the business's goals. Stakeholders are both the recipients of and creators of value within an organisation (Freudenreich et al., 2020). Liu and Kong (2021) state that a business's strategy is directly related to internal stakeholder perceptions and support, and this affects the sustainable development initiatives that are conducted by an organisation. According to Pizzi et al. (2020), the transformation into legitimate sustainable development by industries has to be driven by internal stakeholders through the encouragement of socio-environmental goals whilst driving the economic development of an organisation.

According to Elneel et al. (2023), stakeholder support is the core of the implementation of any business strategy as they are pivotal to the success of these processes directly or indirectly. Yanez et al. (2019) state that internal stakeholders are the drivers of sustainable development as the voice that promotes sustainable development and as the individuals who are in charge of the implementation of sustainable initiatives. Shahzad et al. (2023) argue that it is necessary that employees as internal stakeholders strongly support green transformation within an organisation for it to be a success as they are the custodians in charge of fulfilling the tasks required to realise the transformation. According to Stahl et al. (2020), employees, as internal stakeholders, are the best equipped to drive the success of sustainable initiatives and projects; likewise, they can also be pivotal in the failure of these initiatives.

Liszbinski et al. (2023) concur with the view of Stahl et al. (2020) as they state that a collaboration between investors and employees to drive sustainable initiatives is the basis for the adoption of sustainable development practices as they are directly involved with business performance and transformation. Stocker et al. (2020) suggest that the perceptions of internal stakeholders, namely employees, are critical in the planning and implementation of sustainable initiatives as they have been directly involved with business processes and, therefore, can provide insight into potential risks and opportunities for new practices. Herold et al. (2019) argue that internal stakeholders are often underutilised in the planning and implementation phase of sustainable initiatives, even though they are arguably one of the most important stakeholders, as the success of the initiative resides with their execution of the tasks required to realise the initiative. According to Stocker et al. (2020), an organisation must liaise with employees regularly to promote business development and proper risk assessment. Rahardja (2023) states that collaboration between the various stakeholders in a business creates a level of awareness and a shared vision. This improves the implementation and identification of risks as noted by Ali et al. (2023), Maskrey et al. (2023) and Zouari-Hadiji (2023) previously. This highlights the link between the theory of risk identification and the internal stakeholder theory. According to Brogi et al. (2022), awareness and knowledge management are critical in the internal stakeholder theory as they provide insight into business operations, reduce employee dissatisfaction, create learning between different departments, minimise redundancies, improve the successful implementation of new business processes and create synchronised work streams. The dissemination of knowledge in an organisation is critical in creating awareness and it is important that this is actioned through training sessions, communication channels and awareness campaigns (Brogi et al., 2022). According to Rodríguez-Espíndola et al. (2022), proper stakeholder integration cannot be successful if there is a lack of sharing of knowledge and information between departments in an organisation. Tiwari (2022) argues that the sharing of information and knowledge should be both bottom-up and top-down to develop a complete understanding of business processes.

The internal stakeholder theory is critical for this study as it focuses on the perception that employees and investors are the core drivers of sustainable initiatives. This study aligns with the internal stakeholder theory as the perception is that employees will provide crucial insights into the barriers that are facing green logistics within CIPLA Medpro Manufacturing as well as potential resolutions to alleviate or provide countermeasures to these barriers.

2.6 Conclusion

This Chapter serves as a basis for the conceptual framework that guides the research whilst conducting the study. The definitions and theories covered in this Chapter will set the premise of the study. The theories that are discussed are aligned with the study to develop a guideline that will be used throughout the study.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

In this Chapter, relevant literature is reviewed to provide deeper insights into the discipline of GSCM within the pharmaceutical industry in South Africa. Concepts are discussed to examine the various elements that contribute to GSCM initiatives and highlight potential linkages to the study. According to Ricardianto et al. (2022), GSCM is a concept that has been around since the 1990s but is still relatively new within the pharmaceutical sector. The motivation behind the poor adoption of this green practice within the pharmaceutical sector is the complexity of pharmaceutical supply chains (Ricardianto et al., 2022). Flynn et al. (2021) state that the complexity of the supply chain processes within the pharmaceutical sector is due to the strict government regulations, production practices, sourcing limitations and the lack of alternatives to pharmaceutical ingredients. Parida et al. (2023) argue that the identification and assessment of the barriers that impact sustainable initiatives are essential to ensure the success of these initiatives, especially in complex industries. This Chapter examines the various elements that contribute to GSCM initiatives and highlights potential linkages to the study.

3.2 Sustainability

Sustainability is a term that has become widely used both in industry and social circles. Due to the popularity that it has gained over the years, the definition of sustainability has become skewed. The importance of determining the correct definition of sustainability is emphasised by Nugroho et al. (2021:11), who state:

> Our current and future problems, including global climate change, ozone dissipation, pollution, resource depletion, and population growth, are daunting but nevertheless urgent and relevant to the survival and future prosperity of the human species. In order to address some of these problems that stem from firm activities such as pollution and resource depletion, the concept of sustainable production is clarified, applied, and placed into the decision-making calculus used by our leaders and policymakers to define our future.

The term sustainability originated from the Brundtland report of 1987 by the World Commission on Environmental Development (Brundtland, 1987). Brundtland (1987) identified the causes of environmental degradation by exploring the interconnections between social equity, economic growth and environmental problems and further went on to develop policy solutions that integrated all three areas. The purpose of establishing a policy that integrated all three elements was to ensure that a balance was established between environmental concerns, economic stability and maintenance of social well-being. According to Pop et al. (2019), the neglect of any of these pillars would cause an imbalance in global sustainability and would ultimately result in instability for the environment and mankind.

The term sustainability has developed over the years, with authors making adaptions to the original definition of sustainability. The definitions were based on different perspectives of various researchers and scholars but were linked to a core perception that it referred to the maintenance of the environment and society for future generations. Table 3.1 highlights definitions given by various authors on their understanding of the term sustainability throughout the years.

Table 3.1: The development of definitions of sustainability

Author	**Definition**
Brundtland (1987: 2)	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Pearce and Turner (1989: 3)	Sustainable development involves devising a social and economic system, which ensures that these goals are sustained, that is, that real incomes rise, that educational standards increase, that the health of the nation improves and that the general quality of life is advanced.
Holdgate (1993: 481)	Development is about realising resource potential, and sustainable development of renewable natural resources implies respecting limits to the development process, even though these limits are adjustable by technology. The sustainability of technology may be judged by whether it increases production, but retains its environmental and other limits.
Turner et al. (1993: 14)	Sustainable development is concerned with the development of a society where the costs of development are not transferred to future generations, or at least an attempt is made to compensate for such costs.
Drexhage and Murphy (2010: 10)	Sustainable development is now out of the environmental classification 'box' and is now considered in social, economic, and geopolitical agendas. In other words, sustainable development embodies integration, understanding and acting on the complex interconnections that exist between the environment, economy, and society.
Khoshnava et al. (2018: 82)	A simplistic way of looking at sustainability is meeting the needs of the present generation without compromising the ability of future generations to one day meet theirs.
Wintzheimer et al. (2021: 2)	In a most simplified definition, sustainability just means the ability to exist constantly. As far as humankind is concerned, it is often defined as living in a way that is not at the expense of future generations.

The definition of the Brundtland report has been used by numerous authors such as Ahimin et al. (2019), Babatunde (2018), Guo (2018), Henderson and Loreau (2023) and Zhu et al. (2023). Brundtland (1987) identified two concerns that need to be aligned, namely, development and the environment. Brundtland (1987: 2) states:

> The concepts of needs, in particular, the essential needs of the world's poor, to which overriding priority should be given, and the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs.

Biancardi et al. (2023), Dhahri and Omri (2018) and Schoor et al. (2023) identify another view of sustainability, which is that sustainability is supported by three dimensions or pillars, which are social, environmental and economic. Kumar et al. (2019) and Lakatos et al. (2018) agree that sustainable development can be identified as a potential pathway to focus development towards a more inclusive model, which aims to achieve a symbolic relationship among desirable economic, social, and environmental systems for both present and future generations.

The origins of sustainability can be traced back to the 1970s when the term sustainable development was created (Rome, 2021). Espíndola et al. (2021) state that there is evidence of sustainability dating back to the 17th and 18th centuries by authors such as John Evelyn and Hanns Carl von Carlowitz, who introduced the concept of a sustainable yield in response to dwindling forest resources across Europe. According to Evans (2023), the term sustainability drew traction in 1987 when the United Nations World Commission on Environment and Development published its report titled, 'Our Common Future' also known as the Brundtland Report. This report called for a new era of economic growth that was forceful and, at the same time, socially and environmentally sustainable (Espíndola et al., 2021). Verma (2019: 1) posits that the term 'sustainability' initially appeared as sustainable development, which the United Nations World Commission on Environment and Development defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", as presented earlier. This definition is extremely appealing because it holds the possibility of reconciling people's needs with biophysical environmental management goals through economic development. Ruggerio (2021) states that sustainability captures the essence of a much larger concept that attempts to address both tangible and less tangible necessities for life, which, in turn, was seen to depend on reviving growth; changing the quality of growth; meeting essential needs for jobs, food, energy, water, and sanitation; ensuring a sustainable level of population; conserving and enhancing the resource base; reorienting technology and managing risk; merging the environment and economics in decision-making; and reorienting international economic relations. According to Cruz (2023), reports such as the 'Rio Declaration', which consisted of 27 principles intending to guide the future of 'sustainable development' and 'Agenda 21' (which articulates a plan for implementing these principles into practice), were the foundation for institutionalising sustainability.

In 1987, the United Nations World Commission on Environment and Development, which had been set up in 1983, published a report that was titled ‘Our common future’ (Barrie et al., 2022; Lynch and Khan, 2020; Sharma, 2021). This report came to be known as the ‘Brundtland Report’ after the Commission's chairwoman, Gro Harlem Brundtland (Lynch and Khan, 2020). The purpose of the report was to develop guiding principles for sustainable development (Lynch and Khan, 2020). According to Riccardini et al. (2023), the Brundtland Report stated that critical global environmental problems were principally the result of the vast poverty of the South and the unsustainable patterns of consumption and production in the North. The report called for a strategy that united development and gave rise to the term known as ‘sustainable development’ (Riccardini et al., 2023). In 1989, the report was debated in the United Nations General Assembly, which decided to organise a United Nations Conference on Environment and Development (Kostecka et al., 2019).

Carvalho and Sousa (2018) suggest that the Brundtland Commission report set four critical conceptual building blocks of organisational sustainability. These concepts were:

- Lean conservation of non-environmental resources.
- Green conservation of non-renewable natural resources.
- Ethical commitment to and practice of social equity and justice, community involvement and contribution and positive regard for the treatment of the enterprise’s human capital.
- Real implies lean, green and ethical practices and their financial, societal and environmental results.

The ‘Rio Declaration’ was established by The United Nations Conference on Environment and Development, which met in Rio de Janeiro from 3 to 14 June 1992 (May et al. 2022). According to Raza et al. (2023), the purpose of this conference was to reaffirm the Declaration of the United Nations Conference on the Human Environment adopted in Stockholm on 16 June 1972. This meeting also served as a discussion point to work on achieving the goals set in the Brundtland Report (Kumar et al., 2019). Farah and Giudice (2023) state that the aim of this conference was not only to reaffirm previous policies but also to build upon them, to establish a new and equitable global partnership through the creation of new levels of cooperation among states. This meeting focused on key sectors of societies and people that were working towards international agreements, which focus on the interests of all and protect the integrity of the global environmental and developmental systems (May et al., 2022). Recognising the interdependence between the nature of the Earth and humanity, they established 27 guiding principles for sustainability (Kumar et al., 2019). This became known as the ‘Rio Declaration’. These principles have been extracted from the Declaration and listed in Table 3.2.

Table 3.2: Rio Declaration guiding principles

Principle	Description
Principle 1	Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.
Principle 2	States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.
Principle 3	The right to development must be fulfilled so as to equitably meet the developmental and environmental needs of present and future generations.
Principle 4	In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.
Principle 5	All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.
Principle 6	The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.
Principle 7	States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.
Principle 8	To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.
Principle 9	States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.
Principle 10	Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11	States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.
Principle 12	States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.
Principle 13	States shall develop national laws regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control of areas beyond their jurisdiction.
Principle 14	States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.
Principle 15	In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.
Principle 16	National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, considering the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.
Principle 17	Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.
Principle 18	States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.
Principle 19	States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.
Principle 20	Women have a vital role in environmental management and development. Their full participation is therefore essential to achieving sustainable development.
Principle 21	The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22	Indigenous people and their communities, and other local communities, have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognise and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.
Principle 23	The environment and natural resources of people under oppression, domination and occupation shall be protected.
Principle 24	Warfare is inherently destructive of sustainable development. States shall therefore respect international law to provide protection for the environment in times of armed conflict and cooperate in its further development, as necessary.
Principle 25	Peace, development and environmental protection are interdependent and indivisible.
Principle 26	States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.
Principle 27	States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

Source: United Nations Conference on Environment and Development (1992: 3-8)

These guiding principles have provided a foundation for the implementation of sustainable initiatives across countries and organisations. The principles that are pertinent to green logistics and sustainability within the pharmaceutical sector are principles four, eight, eleven and thirteen. These principles highlight the need for sustainable development and provide insight into the need for government intervention in the form of regulations, taxes and incentives that directly impact the pharmaceutical industry in South Africa. According to Riccardini et al. (2023), the guiding principles that have been provided by the Rio Declaration provide a framework for the world to implement sustainable initiatives that support sustainable development. Colombo (2017) further explains that to achieve these principles, an organisation or country will need to have a strong centralised enforcement system. Therefore, if not enforced by institutions, these principles are only words; as a result, a number of environmental injustices have arisen throughout the years.

According to Mahmud et al. (2023), in the last few years, sustainability has passed from a vague concept promoted by public bodies in developed countries to a daily concern of the majority of people and corporations across the world. Despite the prominence of sustainability as a critical area of concern, many trajectories show that the world is currently unsustainable based on the current usage by humans (Bennett et al., 2019; Wamsler, 2020). According to Fassio and Chirilli (2023), the lack of sustainable development initiatives puts the well-being of future generations at risk. Ngwenyama et al. (2023) state that to combat this looming risk, society has begun to move towards sustainability. This is evident in the incorporation of sustainable practices in both the private and public sectors internationally (Blythe, 2019). Botchway and Bradley (2023) argue that to reach sustainable development, organisations and individuals must be convinced of the need to be a part of sustainability initiatives. To aid in the process, national governments and multilateral institutions have started to include sustainable development as a core principle in their constitutions and treaties (Cavagnaro and Curiel, 2017).

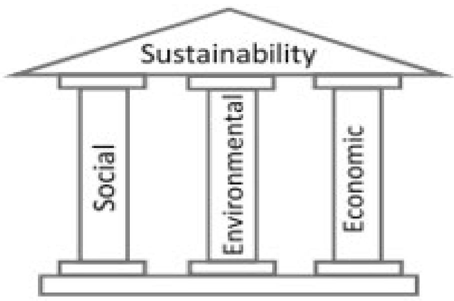
According to Akin et al. (2023), there has also been a surge in academic literature within the discipline of sustainability over the past 20 years. Rawat et al. (2023) suggest that the current approaches to sustainability focus on assessing and resolving the external world of ecosystems, wider socio-economic structures, technology and governance dynamics. Wamsler (2020) also states that the shortcoming of such approaches is the neglect of inner dimensions and capacities, and a limited capacity to facilitate reflection on the cognitive and socio-emotional processes underpinning people's learning, everyday life choices and decision-making. Sanesi et al. (2023) state that there is a need to drastically transform the way we manage numerous marine, freshwater and terrestrial systems in both rural and urban environments to promote environmental sustainability. Deliberate actions are sometimes taken to facilitate the re-wildering or fostering of environmental habitats to re-establish ecosystems (Sanesi et al., 2023). When these deliberate transformations take place, there will inevitably be social implications, both positive and negative (Sanesi et al., 2023). Blythe (2019: 2) provides an example of this phenomenon: "Actions by fishery management authorities, such as the creation of no-take marine protected areas or reductions in fishing effort, can require short-term losses to produce long-term net economic gains". Therefore, a middle-ground needs to be achieved between sustainable development initiatives and social implications. Sarkar et al. (2023) posit that this can be described as sustainable consumption and production (SCP). According to Sánchez and Martínez (2023), this concept was established during the 1992 United Nations World Summit on Sustainable Development, as a response to the sustainability challenges facing communities globally. According to Lakatos et al. (2018: 865), the Norwegian Ministry of Environment defined sustainability as:

> The use of services and related products, which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of further generations.

It is evident that not only is sustainable development an area of concern for societies and the government but also for businesses, which has resulted in a large number of organisations adopting sustainable practices to ensure that they contribute to the movement towards sustainability.

3.2.1 Three pillars of sustainability

Kaur and Kander (2023) suggest that sustainability can be broken down into three categories or pillars, namely, environmental, societal and economic sustainability. Ranjbari et al. (2021) argue that the social, environmental and economic pillars of sustainable development are intimately interrelated and cannot be considered separately. Purvis et al. (2019) state that one particularly prevalent description of 'sustainability' employs three interconnected 'pillars' known as the 'three pillars of sustainability'. These pillars consist of economic, social and environmental factors (Asche et al., 2018; Kaur and Kander, 2023). Aljboor et al. (2023) suggest that this approach can also be identified as the 'three Ps' approach, which consists of people, planet and profit and translates into societal, environmental and economic sustainability considerations, respectively.



Source: Cavagnaro and Curiel (2017: 74)

Figure 3.1: Three pillars of sustainability

According to Cavagnaro and Curiel (2017), the origin of the three pillars of sustainability is sustainable development, which aims to secure a better quality of life for all, both now and for future generations. Aljboor et al. (2023) suggest that this is achieved by pursuing responsible economic growth, equitable social progress and effective protection of the environment. Baker et al. (2023) emphasise that due to the complex nature of sustainability, there must be a balance between the trade-offs of social, environmental and economic concerns. Once each pillar is in equilibrium, an organisation can meet its optimal level of sustainability. However, due to consistent changes in the economy, society and the environment, it is often difficult to maintain equilibrium between all of the pillars. Many organisations focus on specialising in one or two of the pillars of sustainability due to constraints within the respective organisation or the industry in which they operate. Epstein et al. (2018) postulate that it is unlikely that any organisation has fully integrated or achieved sustainability as this is a huge task, however, numerous organisations have taken the essential steps toward improving their sustainability performance and reducing their negative social and environmental impacts. Each of the three pillars of sustainability has issues that negatively impact them. Below is a diagram that highlights some of the basic challenges faced by each pillar (Table 3.3), highlighting the factors that impact each of the pillars of sustainability.

Table 3.3: Factors affecting pillars of sustainability

Pillar of Sustainability	**Factor**
Environmental pillar	Air, water and soil pollution, loss of biodiversity, resource depletion and excessive land use jeopardise the Earth's life support systems.
Societal pillar	High unemployment, poor working conditions, social vulnerability, the poverty trap, inter- and intragenerational equity, and widening inequalities.
Economic pillar	Supply risk, problematic ownership structures, deregulated markets, and flawed incentive structures lead to increasingly frequent financial and economic instabilities for individual companies and entire economies.

Source: Adapted from Maciková et al. (2018: 1-5)

3.2.1.1 Social sustainability

Ota et al. (2022) state that one of the social concerns driving sustainable development is that it is only when people's basic needs are met that they can begin to actively address biophysical environmental concerns, as outlined in the Brundtland Report. According to Cavagnaro and Curiel (2017), there are three dimensions of sustainable development that resonate under the pillar of social sustainability, namely, responsible economic growth, equitable social progress, and effective environmental protection. Pop et al. (2019) support this theory by suggesting that the three dimensions are the core of a sustainable society. Al-Emran and Griffy-Brown (2023) argue that to achieve these three dimensions; societies need organisations and individuals that are driven to achieve sustainable goals. Rau et al. (2018) suggest that social sustainability is an often disregarded aspect of sustainability, as sustainable development debates often focus on the environmental or economic facets of sustainability. However, according to Rau et al. (2018), all three dimensions of sustainability must be addressed to attain a truly sustainable outcome.

Sainati et al. (2023) state that social sustainability arises when the systems, formal and informal processes, structures and relationships actively support the capacity of current and future generations to create healthy and livable communities. According to De Fine Licht and Folland (2019), socially sustainable communities are equitable, diverse, connected and democratic, and provide a good quality of life. Carvalho and Sousa (2018: 1) emphasise this by stating: “an economic, social and ecological perspective on the value that the so-called ‘triple-bottom line’ creates is needed if we are to have a better understanding of value creation in modern societies”. Chen et al. (2021) argue that social sustainability can be further broken down into psychological sustainability. According to Benton (2023), psychological sustainability can be identified as the external and intra-psychic conditions that may enhance mental and physical well-being with benevolent consequences for everyday life and the environment. This condition aligns with the World Health Organisation's (1948) definition of health as being a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (Carvalho and Sousa, 2018).

According to Carpiniello (2023), Dery (2023), Fanning et al. (2022), Hope (2023), Robaj (2023) and Zeini et al. (2023) factors that impact social sustainability are crime, quality of life, poverty, corruption, conflict and war and food security. According to Robaj (2023), crime affects both businesses and societies as it puts the general population at risk and negatively impacts investor confidence in a country. Zhanbayev et al. (2023) argue that safety and security form a foundational level of social sustainability and should be a priority for both the public and private sectors as it directly impacts communities, investment, quality of life of a country's population, alignment to social attitudes and business performance. Manea et al. (2023) and Sesele and Marais (2023) state that in South Africa, crime is a critical factor that impacts social sustainability and quality of life. The high frequency of crime in South Africa has created fear amongst communities and driven people to invest in security infrastructure to ensure their well-being. According to Kulmie et al. (2023), crimes such as corruption directly impact the wealth of a country as well as public support and commitment to the government. Zeini et al. (2023) state that corruption directly impacts the spread of wealth within a country. According to Gilsinan et al. (2023), in a government setting, corruption can drive funds illegally towards a select few individuals and away from communities that need it the most. This can result in a reduction in service delivery and development of infrastructure, which negatively impacts the quality of life for the vast majority of the population and social sustainability within a country (Gilsinan et al., 2023). According to Hope (2023) and Nugroho and Julianti (2023), quality of life is a perception that is created by individuals based on their personal beliefs and their ability to meet basic needs and desires, which drives social sustainability. According to Mehta et al. (2023: 27), "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". Zeini et al. (2023) state that quality of life is a component of social sustainability as it can be seen as a measure that depicts the level of satisfaction and even potential productivity of a community or the general population within a country. Dery (2023) states that poverty is a core requirement for social sustainability as it directly impacts the quality of life within a country. According to Adeyeye et al. (2023), poverty occurs when the majority of a country's population lives below the minimum standard of living, which results in a lack of basic necessities such as food and shelter. This creates an imbalance in society and significantly reduces social sustainability (Adeyeye et al., 2023). According to Hassen and Bilali (2022), negative factors such as poverty and reduced access to basic needs often drive conflict and war within a country or even between countries. Carpiniello (2023) states that conflict is a direct barrier to social sustainability as it leads to death and disease and a reduction in the quality of life. Some of the common impacts of war on a country are long-term physical and psychological harm to children and adults, famine and hunger, as well as a reduction in material and human capital (Carpiniello, 2023). Paudel et al. (2023) state that famine and hunger often cause an imbalance in social sustainability as it increases competition and the likelihood of crime and conflict between individuals. According to Bozsik et al. (2022), famine occurs when a country cannot manufacture or import the amount of food required to meet the needs of its population. This then results in some communities and individuals not having access to necessary food sources (Bozsik et al., 2022). According to Fanning et al. (2022), social sustainability cannot be achieved if a country cannot meet the needs of its population.

Mock et al. (2019) state that psychological sustainability includes all aspects that may contribute to individual satisfaction, feelings of self-efficacy, self-esteem, emotional balance and fulfilment. Carvalho and Sousa (2018) argue that even though psychological sustainability is justified, it is not always attainable. Individuals may experience situations that may affect their psychological state (Carvalho and Sousa, 2018). According to Chen et al. (2021), even though social products are put in place, such as programmes to help vulnerable people, promote healthy lifestyles, or even fight addictive behaviours, it is difficult to control and maintain the social well-being of all individuals. Karbassi (2021: 2) states that within businesses and organisations:

> Social sustainability is about identifying and managing business impacts, both positive and negative, on people. The quality of a company's relationships and engagement with its stakeholders is critical. Directly or indirectly, companies affect what happens to employees, workers in the value chain, customers and local communities, and it is important to manage impacts proactively. Businesses' social license to operate depends greatly on their social sustainability efforts. In addition, a lack of social development, including poverty, inequality and a weak rule of law, can hamper business operations and growth. At the same time, actions to achieve social sustainability may unlock new markets, help retain and attract business partners or be the source of innovation for a new product or service line. Internal morale and employee engagement may rise, while productivity, risk management and company-community conflict improve.

Karbassi (2021) suggests three additional steps which improve overall societal sustainability within businesses and organisations. Firstly, to contribute in other ways to improve the lives of the people they affect, such as by creating decent jobs, goods and services that help meet basic needs, and more inclusive value chains (Karbassi, 2021). Secondly, by making strategic social investments and promoting public policies that support social sustainability (Karbassi, 2021). Finally, to partner with other businesses, pooling strengths to make a greater positive impact (Karbassi, 2021). According to Ly and Cope (2023) and Vallance et al. (2011), there are three key elements or schemas that social sustainability rests on, namely, development sustainability, bridge sustainability and maintenance sustainability.

Development sustainability is focused on addressing basic needs, the creation of social capital, justice and similar societal issues (Gomez and Crowther, 2022). According to Al-Omoush et al. (2022), education is a core element of development sustainability as it provides the tools needed to increase the social capital of individuals and improve their ability to acquire basic needs. Fahad et al. (2023) state that the level of education that an individual has also impacts the productivity of an organisation and, therefore, also influences the economic sustainability of an organisation. The development of social capital within a country also has a direct correlation to the economic performance of that country (Fahad et al., 2023). According to Vasseur et al. (2022), to achieve a sustainable society, education is an essential element that reduces social instability and supports development sustainability. The more educated the general population is within a country the more likely it is that a degree of social sustainability can be achieved (Vasseur et al., 2022). Bridge sustainability refers to the changes in behaviour to achieve biophysical environmental goals (Gomez and Crowther, 2022). Bridge sustainability is focused on exploring ways to promote eco-friendly behaviour or stronger environmental ethics (Gomez and Crowther, 2022). Some of the disciplines that are represented by this pillar are psychology, socio-ecological studies and environmental sociology. According to Janker et al. (2019), the main aim of this approach is to build better bridges and connections between people and the biophysical environment to harness human potential to generate an improved environmental state. In this approach, there are two views of improving the biophysical environment, namely, 'transformative' and 'non-transformative' approaches. Gomez and Crowther (2022) suggest that the transformative view radically re-imagines people's relationships with the environment, other humans and non-humans, whilst non-transformative methods are conventional and have a fairly limited scope. Maintenance sustainability refers to the preservation of sociocultural characteristics in the face of change and how people actively embrace or resist those changes (Janker et al., 2019). Purvis et al. (2018: 2) state:

> In order to meet this sustainable pillar, a business should have the support and approval of its employees, stakeholders and the community it operates within and to gain the support of its employees, an organisation will have to develop relationships through initiatives such as a focus on employee retention and development, better employment benefits and treating employees fairly overall. For community support, companies will have to engage with the community through initiatives such as investment in public projects, scholarships, and sponsorships.

Miroshnychenko and De Massis (2022: 68) state:

> Much of the early literature on sustainability focused on economic development, with productive sectors providing employment, desired consumption, and wealth. More recently, attention has shifted to human development, including an emphasis on values and goals, such as increased life expectancy, education, equity, and opportunity. Finally, the Board on International Sustainable Development also identified calls to develop a society that emphasised the values of security and well-being of national states, regions, and institutions as well as the social capital of relationships and community ties.

The importance of the social pillar of sustainability is highlighted by Panzarella et al. (2023) as it is claimed that this pillar affects employees in their desire to work for the organisation, customers in their desire to buy from the organisation and the community in its desire to permit the organisation a license to operate.

3.2.1.2 Economic sustainability

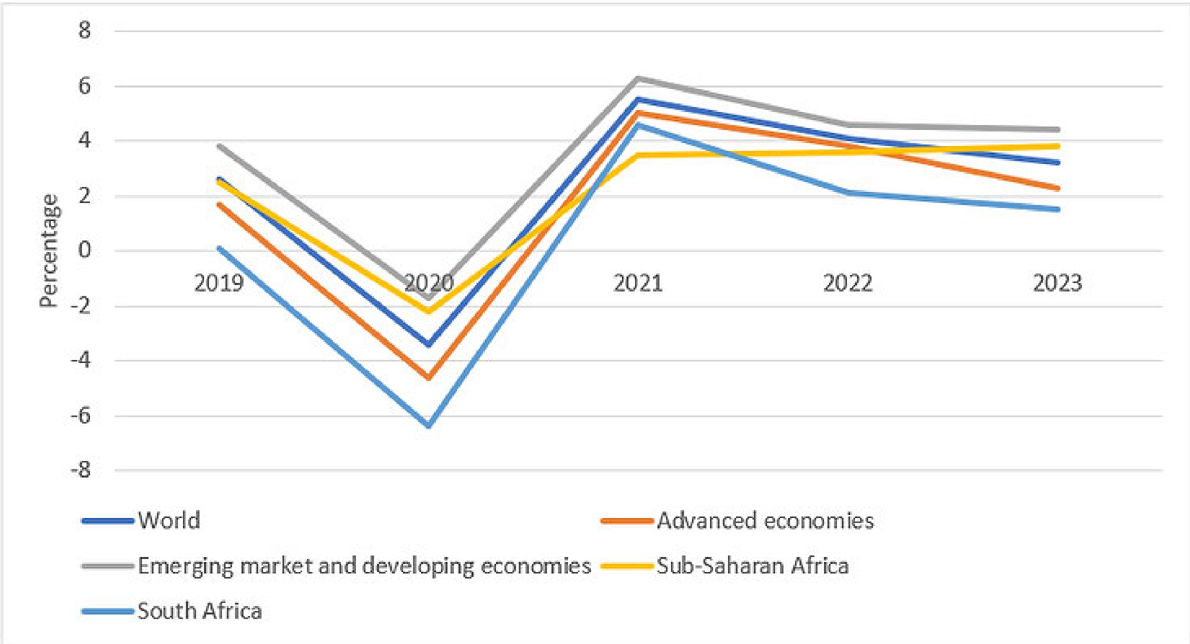
Andersen et al. (2023) argue that the economic health of a country is of critical importance to both the country affected and its neighbours. Economic and monetary instability can lead to dictatorship and attrition of countries, which ultimately results in war, which many politicians and economists believed to be the cause of the Great War (World War I) (Díaz de Otálora et al., 2021). This leads to the pillar of sustainability known as economic sustainability. According to Courtnell (2019), economic sustainability can refer to either the continued success of an economy over time or, more recently, to the way an economy operates sustainably, protecting social and environmental elements. Díaz de Otálora et al. (2021) argue that economic sustainability is the continuous development and maintenance of human-made stocks. Díaz de Otálora et al. (2021) also suggest that this means the reduction of poverty and equitable distribution of wealth. Geiger and Swim (2020) and Guth et al. (2020) argue that economic sustainability is related to sustainable development, which focuses on meeting the needs of the present without compromising the needs of future generations by ensuring sustained economic sustainability. Courtnell (2019) states that economic sustainability cannot be achieved without having a sustained healthy environment and society. Cavagnaro and Curiel (2017) identify three risks that are associated with poor economic growth, which are identified in Table 3.4.

Table 3.4: Three risks associated with poor economic growth

Risk	Description
Malthusian society	• This is a society that grows exponentially but cannot maintain the resources production to meet this growth. • In this type of society, if food production does not grow at a pace that meets population growth, then either a portion of the population will starve, or the overall amount of food received by an individual will decrease.
Diminishing returns	• The economic law of diminishing returns states that in a production system with fixed and variable inputs, beyond some point, each additional unit of variable input yields less and less additional output. • Suppose also that all other factors needed to produce crops (such as seeds, rain and manure) are fixed and that one farmer obtains one ton of crop from the farm. The law of diminishing returns states that a second farmer on the same land (doubling labour) will not push the growth up to two tons, doubling the output, but rather to less than that. The return of adding a third farmer will be even less, and in the end, the costs involved with adding a new farmer will outstrip the gain in crop yield. • This suggests that economic growth can plateau and eventually not meet the requirements of growing demand.
Uneven distribution of Wealth	• In most countries, there is an uneven distribution of wealth among the residents. This means that not everyone has the same disposable salary or access to goods and services, and amenities available to them. • For example, if someone is born into poverty, they have limited access to goods and services such as food and high-class medical care, as opposed to another individual born into a wealthy family. • This gap between the rich and the poor diminishes the more a country's economy develops as there is more wealth to distribute.

Source: Adapted from Cavagnaro and Curiel (2017: 190)

Each of the above tabulated risks adversely affects the population of a country, which then begs the question of how one can have sustainable development if there is no economic growth (Al-Qudah et al., 2022). Simply put, it is difficult and borderline impossible to maintain sustainable growth in areas such as the environment and society if there is no finance to sustain the population (Fernandes et al., 2021). According to Cooper and Gibson (2023), once an individual cannot meet their basic needs to sustain a meaningful life, ethical considerations have little importance. Therefore, economic sustainability is seen as one of the most important pillars of sustainability (Fernandes et al., 2021). According to Guth et al. (2020), this is often measured by grouping economic sustainability on macroeconomic and microeconomic levels. On a macroeconomic level, this is measured as a country's GDP (Guth et al., 2020). The calculation on a microeconomic level is more complex as it takes into consideration income per person less than the general costs of living in that country (Guth et al., 2020). In contradiction to the macroeconomic view, Courtnell (2019) argues that economic sustainability is not reflected by a country's GDP as many people believe. The GDP of a country is the total amount of production of goods and services by a nation over a period of time, usually one year (Courtnell, 2019). But this does not mean that everyone in the country is earning above the minimum living standard income. The minimum standard income is the amount of income that an individual would need to adequately meet all of their needs within that country (Courtnell, 2019). People earning below the minimum standard of living income are considered to be in poverty. Figure 3.2 below indicates the GDP for South Africa against various economies. It can be identified from Figure 3.2 that the standard of living of South Africans has been declining since 2021. Figure 3.2 also highlights that the GDP growth in South Africa has been significantly less than in other countries, which is an area for concern as it is a measure of economic sustainability within a country.



Source: Ngozo (2022: 1)

Figure 3.1: GDP growth of South Africa against other world economies

This study adopted the definition of economic sustainability set by Courtnell (2019: 2), which states: "Economic sustainability refers to growth inclusive of practices that support the preferred percentage of its population below its preferred minimum standards of living level, without negatively impacting social, environmental, and cultural aspects of the community".

The definition chosen incorporates both of the generally accepted definitions of economic sustainability and allows an individual to understand this pillar of sustainability from both an economic and environmental standpoint. According to Courtnell (2019), the root causes of poor economic stability are overconsumption, overpopulation, poor infrastructure, unexplored renewable energy options, wastage of energy, poor distribution system and delays in the commissioning of power plants.

According to Sabadash and Denysenko (2018), root causes must be identified early to prevent the degradation of the environment and economy. Javanmardi et al. (2023) suggest that if the root causes of poor economic sustainability are not identified, then the solutions cannot be developed, and this is what ultimately causes poor economic performance. Fischer et al. (2023) and Maciková et al. (2018) postulate that to be economically sustainable, a business will need to ensure that it earns a profit and can successfully operate for the foreseeable future. However, Purvis et al. (2018) argue that this pillar should never be in contradiction with the previous two pillars and that the activities of this pillar include compliance, proper governance and risk management. Epstein et al. (2018: 70) emphasise that “sustainability can create financial value for the corporation through enhanced revenues and lower costs”, which highlights the link between the environmental and economic pillars of sustainability. Each of these three components needs to be in equilibrium for sustainability to be achieved. According to Guth et al. (2020), economic sustainability is the foundation of sustainable development, and if the industry is not prioritised, it will cause an economic collapse, which negatively impacts a country and its neighbouring countries. It is important to note that the above perspective by Guth et al. (2020) looks solely at human well-being and not that of the environment, as it highlights the impact on human societies only, which is a biased perspective. Table 3.5 reflects the growing unemployment rate in South Africa, thus making employment a priority for most South Africans.

Table 3.5: South African employment statistics

Measure	**2021 (Year)**	**2020 (Year)**	**Unit**
Unemployment Rate	34.9	34.4	%
Youth Unemployment Rate	66.5	64.4	%
Unemployed Persons	7600	7800	Thousand
Population	59.3	58.8	Million

Source: Nomafu et al. (2023: 2) and Trade Economics (2022: 4)

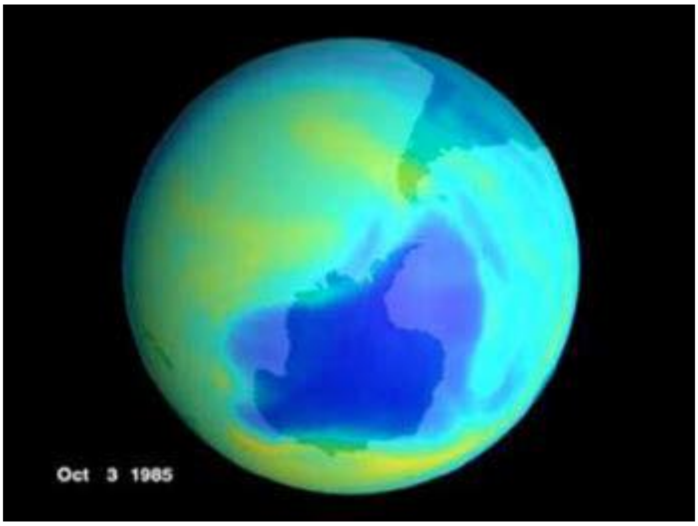
Table 3.5 identifies the increase in unemployment by 0.5%, which could be attributed to a host of aspects such as the COVID-19 pandemic as well as the civil unrest that occurred during the course of 2021. The unemployment rate in South Africa is also high, as approximately one-third of the population (34.9%) is unemployed. This is a clear indication of the motivation behind respondents' responses towards employment as an essential factor for both business and society.

3.2.1.3 Environmental sustainability

The world, as immense and abundant as it may seem, has limited resources available to its population. Growing concerns around the scarcity of resources are one of the driving factors of sustainability. Emina (2021) states that the natural environment is endangered because of human activity and that humanity must take responsibility for the current degradation of the environment. In early times people were seen as the masters of nature and treated as such, and technological developments allowed communities to grow and develop at an exponential rate (Haupert, 2019). This is evident in the 1900s when the rapid expansion caused by the industrial revolution began, resulting in a spurt of technological innovations (Haupert, 2019). The gross use of the Earth's resources continued without regard until signs of environmental degradation started to surface according to Haupert (2019). The assertions by Haupert (2019) do not have adequate proof to support that the overuse of the Earth's natural resources was prevalent across the entire world prior to environmental degradation. Although visible environmental degradation may have increased the widespread adoption of sustainable practices, it does not suggest that the abuse of natural resources was a global phenomenon. Issues such as acid rain, pollution and natural disasters acted as red flags to identify the potential threats that arise from the abuse of the natural environment and its resources (Emina, 2021).

According to Evans (2020: 1), "environmental sustainability is about acting in a way that ensures future generations have the natural resources available to live an equal, if not better, way of life as current generations". Alternatively, Hawken (2017) argues that environmental sustainability is about stabilising the currently disruptive relationship between the Earth's two most complex systems: human culture and the living world. Howes et al. (2017) share the view made by Andriansyah et al. (2021) and Evan (2020), supporting this perspective by stating that environmental sustainability is ensuring that meeting the needs of the present generation should not compromise the ability of future generations to meet their own needs with respect to the availability of natural resources. According to Qu and Ji (2023), the growth in the popularity of sustainability in academics is something that began in the 1990s; even though literature can be traced back to the mid-1900s, the amount of research in the field of environmental sustainability grew in traction as society realised that the impact of poor environmental practices could cripple human well-being.

From the 1940s to the 1950s, a multitude of new technological advancements were used to resolve issues such as food production and the occurrence of disease in the human population (Tudi et al. 2021). As technology developed, so did the instruments to test toxicity, measure pollution and identify possible future threats to both the environment and humanity (van den Berg, 2017). According to Tudi et al. (2021), it was only in the second half of the 1950s that, using newly developed instruments, scientists discovered that what were considered small and not lethal quantities of chemicals accumulate in the soil, air and water to a level that becomes life-threatening from pesticides. This was not known to the general public until a biologist in training known as Rachel Carson published a book known as 'Silent Spring' in 1962 that identified the dangerous future that humanity was heading towards (Alexander, 2019). The book 'Silent Spring' drove the agenda of environmental degradation and triggered worldwide environmental concern (Alexander, 2019). According to Johnson et al. (2023), the depletion of the ozone layer was identified in 1986 which further promoted the drive towards sustainability. Figure 3.3 is the image of the depleted ozone that soon became a symbol of the movement toward sustainability. The image depicts the damage to the ozone layer that occurred above the South Pole.



Source: Cavagnaro and Curiel (2017: 30)

Figure 3.2: Graphical image of the depletion of the ozone layer above the South Pole

The damage to the ozone layer sparked a global movement in the 1990s to reduce some of the negative impacts associated with human activities on the environment with the approach being reactive rather than a proactive solution (Wang et al., 2021). For example, the use of higher chimneys focussed on moving the smog further away rather than preventing it from occurring (Tassinari and Sarmiento, 2023). The movement eventually reached the stage of proactive sustainable actions whereby the era of clean energy and environmentally-friendly products was now the aim of organisations and governments (Stadelmann-Steffen et al., 2021). Bartolo et al. (2021) state that industries such as the pharmaceutical industry contributed to the damage of the ozone layer as chemicals from pharmaceutical products such as inhalers contribute to the chemicals that impact ozone depletion. According to Pettinger (2018), the Earth's resources can be divided into three categories to simplify their distribution. These three categories are non-renewable resources, renewable resources and semi-renewable resources. Table 3.6 highlights each category of resource and its definition.

Table 3.6: Categories of the Earth's resources

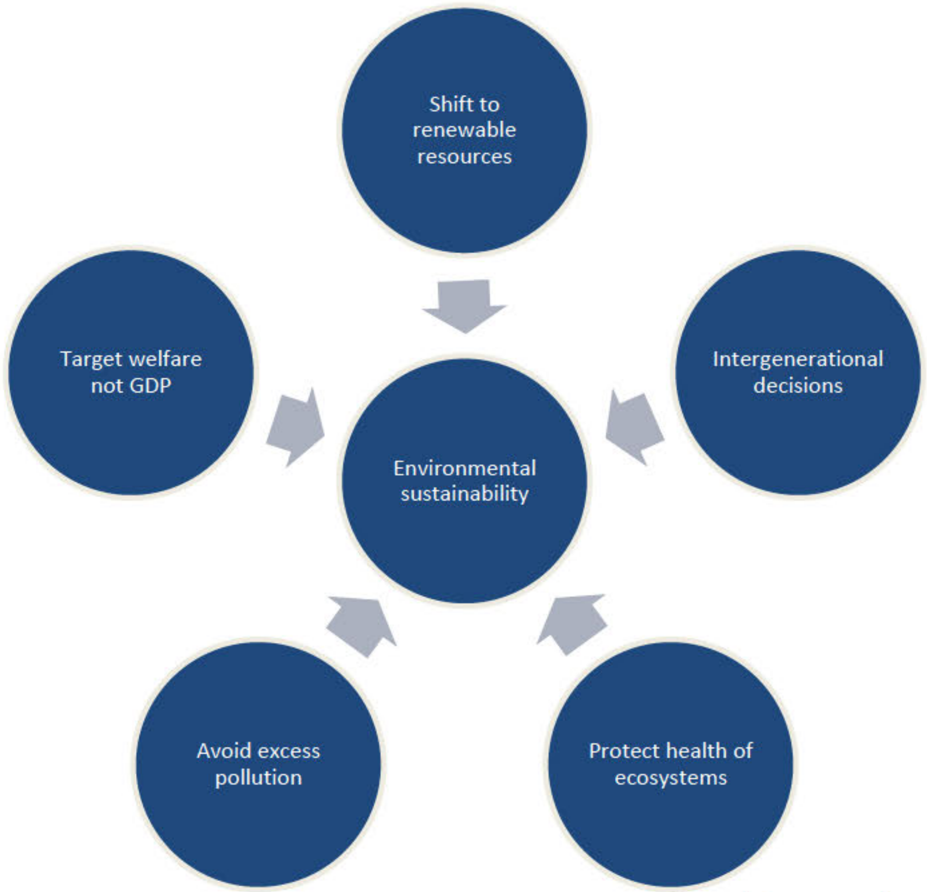
Type of resource	Description
Non-renewable resource	Once this resource is used, it cannot be used again for that purpose. An example is coal. Once the coal is burnt, the resource is no longer available to be used. There is a limited amount of coal in the world, and it can be depleted.
Renewable resources	These are resources that do not diminish after being used. An example would be a wind generator, as it does not reduce the amount of wind and does not impact the future supplies of wind energy.
Semi-Renewable resources	Certain resources can be renewable if used at the correct level. As an example, farmland should be a renewable resource. If crop rotation is practised, then there is no deterioration in the fertility of the soil. However, if the farmland is intensively farmed with the use of artificial fertilisers and pesticides, then the quality of the soil may start to erode.

Source: Pettinger (2018: 4)

Using the identification of the various categories of the Earth's resources, organisations, governments and individuals can determine the level of use that should be considered based on scarcity (Nguyen et al., 2023). Therefore, following this methodology, non-renewable resources should always be given the highest priority with regard to limiting usage (Adams et al., 2018). This should be closely followed by semi-renewable resources; in this case, all parties involved should be educated on how renewing these resources works and methods to use to ensure that these resources remain semi-renewable (Adams et al., 2018). Finally, the least amount of focus on usage should be on renewable resources, as using these will not impact too adversely on society (Adams et al., 2018). According to Abdullah et al. (2023) and Kivi (2018), alternative energy sources must be audited before or it can result in more damage to natural ecosystems. Nuclear energy is one such energy source that has caused a great deal of damage to the environment from both the extraction of uranium and nuclear power leaks (Kivi, 2018). Abdullah et al. (2023) argue that even renewable resources can directly impact the environment and as such a proper analysis must be done on an energy source before it is adopted in a country.

The Earth is seen as a self-regulating planet and works to sustain the life that exists in its domain, for example, the moderation of the Earth's climate from greenhouse gases through forests; the filtering of dangerous radiation from the sun by the ozone layer and the constant level in ocean salinity and soil fertility (Williams and Zalasiewicz, 2022). These are all life-sustaining features provided by the Earth and without them, life on Earth would cease to exist

(Williams and Zalasiewicz, 2022). Lovelock (2019) argues that human beings are part of the greater community of living things that unconsciously keep the Earth a comfortable home and that they do not have any special rights, only obligations to protect the Earth. Lorang et al. (2022) argue that the waste produced by human activity has outgrown the world's ability to dispose of it. According to Anttiroiko (2023), as human waste accumulates, it creates sinks which are places where wastes produced by human activity meet the natural environment and deregulate the ecosystem of that area. Therefore, it can be concluded that unbridled economic growth will diminish the Earth's natural ability to sustain life (Lovelock, 2019). This would make the point of economic growth moot, as instead of improving human life, it is rather endangering it (Lovelock, 2019). To uphold environmental sustainability, organisations and individuals will need to adopt environmentally-friendly techniques and attitudes. Figure 3.4 identifies practices to ensure environmental sustainability.



Source: Adapted from Pettinger (2018: 8)

Figure 3.3: Environmentally-friendly practices

According to Chen et al. (2023), the shift to renewable resources is focused on limiting the consumption of non-renewable resources. According to Hendrix (2022), the movement to renewable energy is focused on improving the environmental performance of organisations whilst reducing dependency on limited resources such as fossil fuels. The protection of the health of ecosystems is aimed at avoiding irreparable damage being done to these ecosystems. Larionov et al. (2020) suggest that the protection of ecosystems directly impacts the well-being of humankind. Moustafa et al. (2023) suggest that overused resources can go extinct, and this can have a direct impact on the ability of humanity to develop medicines and other essential products. According to Gilliam et al. (2023), issues such as the maintenance of rainforests to ensure that future generations have a breathable air supply must be considered, as this has a direct impact on the well-being of humanity. According to Bean et al. (2022), the preservation of ecosystems and wildlife is critical for a number of human activities such as tourism and trade, pharmaceutical ingredients and health care, biodiversity and sustenance. Mangachena and Pickering (2023) agree with Bean et al. (2022) by stating that wildlife protection is critical in South Africa for medicinal ingredients, the livelihood of rural communities, tourism and the protection of biodiversity. Avoiding excess pollution is also critical, as pollution can cause damage to both human health and the Earth's atmosphere. Policies must be created by governments to ensure that pollution levels are at a minimum to ensure that the planet does not deteriorate to the point that future generations face water shortages, high temperatures and other disasters (Pettinger, 2018). The focus on welfare instead of GDP emphasises the value of economic and social welfare as opposed to economic performance (Feng et al., 2023). Svenfelt et al. (2019) support this by identifying that in years to come, the betterment of communities and the creation of sustainable development will be much more valuable than the value created from short-term growth in GDP. Intergenerational decisions highlight the importance of making economic decisions based on long-term consequences. When making economic decisions, the implications that it has on future generations should be considered (Mensah, 2019). Some of the methods used to promote environmentally sustainable behaviour are identified using literature from various authors in Table 3.7.

Table 3.7: Methods to promote environmentally-friendly practices

Method to promote sustainability	**Explanation**	**Authors supporting each method to promote sustainability**
Carbon tax	A tax placed on the production and consumption of carbon	Pettinger (2018); Carattini, Kallbekken and Orlov (2019); Hagmann et al. (2019)
Government regulation to limit harmful emissions	The use of regulations to instil limitations on pollution in organisations	Hart and Feldman (2018), Hong, Yu and Mao (2019); Pettinger (2018)
Subsidising and encouraging more sustainable environmental practices	Governmental rebates and subsidising for the use of sustainable practices by organisations	Chen et al. (2019); Pettinger (2018); Xie et al. (2019); Sovacool (2017)
Shifting consumer and industry behaviour towards sustainable living and development	Changing consumer cultural norms to support sustainable products and organisations and discontinue harmful products	White et al. (2019); Pettinger (2018); Schroeder and Anantharaman (2017); Stranieri et al. (2017)

According to Cohen (2020), many politicians and business leaders are of the mindset that economic growth should be the focus of business and that any harm done to the environment is simply collateral damage. Shao et al. (2020) argue that this view is incorrect as companies develop innovative technologies to meet environmental regulations set by governments, and this promotes improved product development and savings, which drastically improves a company's profitability. This is evident by the use of cheaper renewable energy as opposed to the cost associated with non-renewable energy (Shao et al., 2020). Zhang et al. (2023) suggest that economic growth does not cause environmental degradation but rather that poor environmental performance is caused by the absence of public policy to uphold environmental standards. Abdelkareem et al. (2018) agree with the sentiment of Zhang et al. (2023) by stating that the use of sustainable initiatives such as renewable energy is a method of not just improving environmental performance but also the financial bottom line. A study by Abdelkareem et al. (2018) on the use of renewable energy sources provides supporting evidence of this, as the findings of the study were that the use of renewable energy sources reduces an organisation's overall costs. Díaz de Otálora et al. (2021) point out that among the three pillars of sustainability, the environmental pillar gets the most attention as it deals with organisations focussing on the reduction of negative impacts on the environment. This is further emphasised by Fehrer et al. (2023), who suggest that environmental initiatives include reducing carbon footprints, packaging waste and water and energy usage. Early literature by Common and Perring (1992: 7) highlights the importance of the environmental pillar by stating:

> We cannot abuse and plunder our common stock of natural assets and resources, leaving future generations unable to enjoy the opportunities we take for granted today. We cannot use up or contaminate our environment as we wish, violating the rights and interests of future generations.

More recent literature by Díaz de Otálora et al. (2021) identifies the environmental pillar of sustainability as the pillar that oversees the interaction between human influence on the environment. This pillar ensures that the need for economic stability and social harmony does not undervalue the need for a healthy biosphere. According to Gomes Silva et al. (2022), the environmental pillar is crucial to enforcing sustainable development as it ensures that the world can continue to sustain the various forms of life for the foreseeable future whilst in unison with the development of humankind.

3.3 Sustainable consumption

Twenty years later, the United Nations Conference on Sustainable Development reaffirmed the commitment toward SCP through the creation of a 10-year framework dedicated to the realisation of the SCP programme. Shevchenko et al. (2023) argue that to achieve sustainable development, efforts should go beyond cleaner production to sustainable consumption. According to Noor et al. (2023), sustainable consumption involves buyer behaviours towards greener products that bring less pollution during production. It also requires consideration of changes to lifestyles and changing consumption habits, as this is the key to the success of sustainable consumption (Lakatos et al., 2018; Wang et al., 2019). Sustainable consumption has become increasingly important in preventing negative and non-environmental practices of manufacturers (Lakatos et al., 2018; Wang et al., 2019). As a result, sustainable consumption has gained increasing attention globally (Wang et al., 2019). From a supply chain view, the producer can also be a consumer. This is a result of the consumption of raw materials, labour and consumption of other producers' products and services (Lakatos et al., 2018). Blair (2020: 72) argues that sustainable consumption in a deep sense addresses:

> Throughput (the overall flow of material and energy in the human system), growth (increasing economic activity or throughput or both), scale (the relationship of the scope and speed of economic or ‘material provisioning’ activity to human and ecological capacity), and patterns of resource use (the quantities and qualities of products used, their meanings and their changes per capita over time).

Lakatos et al. (2018) posit that sustainable production is concerned with the volume and types of goods and services produced, the process involved with making them, the natural resources extracted and consumed to make them, and the waste and pollution resulting from the extraction, production, and affiliated process resulting in a particular good. Govindan (2018) states that the movement towards sustainable production and consumption has been increasingly associated with improved health and quality of life as well. According to Khan and Siddiqui (2023), the lifestyles of the health and sustainability marketplace have arisen as a method to frame and market the direct health and quality of life improvements obtained by consumers embracing sustainable consumption of goods and services. Krosofsky (2021) argues that although green products are sustainable, they also are more costly than regular products and, therefore, not a viable option for most consumers in developing countries. Jasrotia et al. (2023) argue that genetically modified foods also contribute to sustainable consumption as it is focused on creating a sustainable food supply for the world's growing population. Mohan (2023) opposes the view of Jasrotia et al. (2023) by stating that genetically modified foods can ultimately have a negative effect on human health due to unnatural changes made to the Deoxyribonucleic Acid (DNA) of an organism, which is later consumed. Ghimire et al. (2023) and Rock et al. (2023) highlight that South Africa is a country that has a number of popular products that are genetically modified and that within Africa as a continent genetically modified foods are becoming more prominent due to the growing population needs.

3.4 The impact of climate change

According to Shashi (2022), pharmaceutical supply chains impact climate change both directly and indirectly through carbon emissions, waste generation, water consumption and pollution, packaging and supply chain activities. Pharmaceutical supply chains will be discussed in detail later in this chapter and the impact of these global supply chains will be highlighted. Hervani et al. (2022) and Sindhwani et al. (2023) argue that climate change also impacts pharmaceutical supply chains adversely through increased disease burden and disruptions in global supply chains. Bauer and Rudebusch (2023) state that climate change increases business and supply chain costs due to damage to infrastructure, shortage of raw materials and supply chain disruptions. According to Dietz et al. (2020), climate change forms one of the greatest challenges, both ecologically and socially, in the 21st century. Malhi et al. (2020) support this by stating that climate change is impacting ecosystems globally through climate variability and increases in ocean acidification. However, Berrang-Ford et al. (2021) argue that even though climate change adversely affects humans and the environment, humans are beginning to adapt to climate change. Nguyen et al. (2023) highlight that climate change is one of the drivers of the adoption of sustainable development due to the negative impacts that it inflicts on both human life and the environment. Some of the definitions of climate change will be discussed.

Simpson et al. (2021: 937) identify climate change as "the changes that occur environmentally and meteorologically as a result of the degradation of the environment over time". Tsagaki-Rekleitou et al. (2022: 155) identify climate change as "a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer". According to Giddy (2019), several extreme weather cases have been felt in South Africa since 2018 as a result of climate change. Some of the affected areas were the Western Cape, Eastern Cape and Northern Cape, which have experienced the loss of human life and damage to the environment due to these extreme weather changes. Denchak and Turrentine (2021: 1) support the definitions of previously discussed literature by stating that "climate change is generally defined as a significant variation of average weather conditions—say, conditions becoming warmer, wetter, or drier - over several decades or more. It is the longer-term trend that differentiates climate change from natural weather variability". According to Qin et al. (2023), extreme weather conditions cause disruptions in supply chains through the damage of infrastructure, destruction of raw materials and the prevention of the transportation of goods and services.

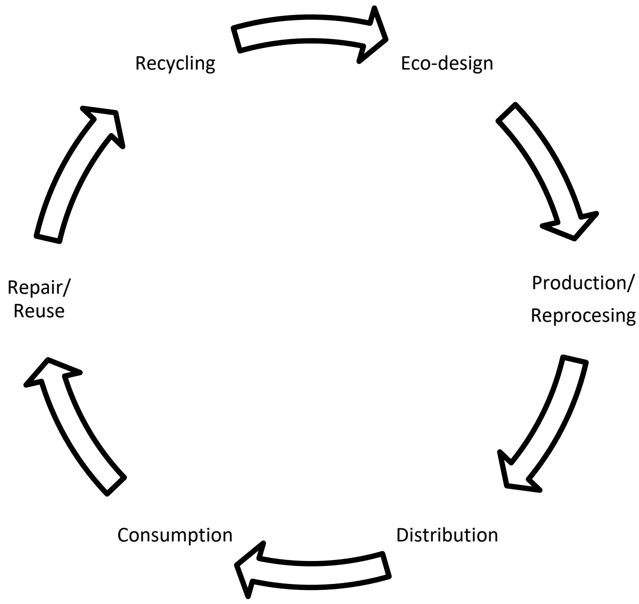
According to Routt (2021), climate change has created challenges for organisations and industries globally. The changes in climate have resulted in shortages of basic necessities such as food, water and electricity (Routt, 2021). This, in turn, directly impacts the economy and communities as it impedes growth and profitability (Routt, 2021). Routt (2021: 4) identifies that "businesses face new risks from supply chain shortages in response to COVID-19, along with increasingly monopolistic business alliances. A strategy that includes sustainability is key to building resilience, improving profits, and reducing risk". Based on the above statement by Routt (2021), it can be identified that sustainability is critical in ensuring the success of businesses in current times, however, the impact of climate change is felt throughout the Earth and affects all known living organisms, according to National Aeronautics and Space Administration (NASA, 2022). According to Hervani et al. (2022) and Sindhwani et al. (2023), supply chain disruptions arise due to climate change. The implications of changes in weather patterns, sea levels and increases in natural disasters directly impact pharmaceutical supply chains through delays in the transportation of materials and finished products, scarcity of raw materials due to habitat destruction and a reduction in productivity (Quitmann et al., 2023). According to Denchak and Turrentine (2021), the impact of climate change will only grow as time goes on, and this will be further aggravated by human-related activities. This will have catastrophic effects on the environment and humankind. Letcher (2021) supports this assumption by stating that climate change will cause the gradual destruction of ecosystems and directly impact humankind adversely. It is imperative that human activities reduce their contribution to climate change, or the consequences will be severe on the Earth and all living organisms.

3.5 The creation of a circular economy

The circular economy concept is trending both among scholars and practitioners globally, according to Kirchherr et al. (2023). Timm et al. (2023) identify the concept of circular economy as an economic model that is aimed at the efficient use of resources through the minimisation of waste, long-term value retention, and reduction of primary resources, product parts, and materials within the boundaries of environmental protection and socio-economic benefits. The opposite of a circular economy is a linear economy in which products are produced, consumed and then disposed of (Kim, 2021). This type of economy is not sustainable as it increases the severity of global concerns such as climate change, scarcity of resources, environmental degradation and pollution (Sharma et al., 2021). The United States Environmental Protection Agency (2022: 1) identifies a circular economy as:

> …an economy that uses a systems-focused approach and involves industrial processes and economic activities that are restorative or regenerative by design, enables resources used in such processes and activities to maintain their highest value for as long as possible and aims for the elimination of waste through the superior design of materials, products, and systems.

Sharma et al. (2021: 1805) define a circular economy as “a more holistic approach that advocates towards extracting the value from the waste and reaching sustainability goals”. Kirchherr et al. (2017) further emphasise these definitions by stating that the concept of a circular economy can be viewed as an operationalisation for businesses to implement the concept of sustainable development. Figure 3.5 depicts the phases of a circular economy.



Adapted from Morseletto (2020: 8)

Figure 3.4: Phases of a circular economy

According to Butt et al. (2023), the circular economy considers production processes and outlines how to reuse, repair and recycle items, thus increasing sustainable manufacturing and consumption. Nascimento et al. (2018) and Xiong et al. (2023) suggest that this, in addition to reducing waste, saves energy and helps avoid irreversible damage caused in terms of climate and biodiversity, as well as in terms of air, soil and water pollution, owing to the use of resources at a rate that exceeds the Earth's capacity to renew them. According to Kim (2021), the aim of a circular economy is to reduce the impact of economic processes by keeping materials, products and energy in the economic system for as long as possible to maximise the value of all consumed resources. To mitigate the environmental consequences, it is necessary to minimise the creation of waste and encourage the use of products, materials, and resources that will remain in the economy for as long as possible (Rossi et al., 2020). These are the foundations of the circular economy which seeks a new model of production and consumption of goods and services associated with sustainability (Rossi et al., 2020). Kim (2021) argues that a circular economy is not a new concept but has only gained popularity due to climate change, resource scarcity and pollution that threatens the environment and human life.

Green consumption is also a concept that is closely related to a circular economy but looks at the consumption of products from an individual perspective. According to Ling et al. (2023), green consumption can be defined as ecologically conscious consumption. This definition is aligned with the literature by Halder et al. (2020), which identifies green consumption as environmentally responsible consumption. Ling et al. (2023) suggest that this is done through the reduction of the consumption of goods as well as the consumption of green products. According to Das (2021: 1):

> A green product is a sustainable product designed to minimise its environmental impacts during its whole life-cycle and even after it's of no use. Green products are usually identified by having two basic goals – reducing waste and maximising resource efficiency. They are manufactured using toxic-free ingredients and environmentally-friendly procedures and are certified by recognised organisations.

Jain et al. (2020) identify that to achieve the goals set by sustainable development, both society and industry have a duty to fulfil in developing and supporting green practices. Therefore, initiatives such as green consumption and green production are critical in ensuring that sustainable goals are met globally (Jain et al., 2020). Halder et al. (2020) suggest that green production is a core element in the movement towards sustainable development as it incorporates environmentally efficient practices into business processes. According to Nguyen et al. (2019) and Ye et al. (2023), the adoption of green production and consumption improves both business and environmental performance within an organisation.

3.6. Internal and external factors impacting the adoption of sustainable practices

De Steur et al. (2020) identify two distinct categories of factors that impact the adoption of sustainable practices within society and businesses, namely, internal and external factors. According to Rasheed (2022), the need for sustainable practices can be linked to corporate goals and performance, which are identified as internal and societal pressures that arise from the negative impacts of poor environmental and societal performance. These factors can act as either a driver or a barrier to the adoption of sustainable practices and, therefore, have a direct impact on the movement towards sustainable development (Rasheed, 2022).

3.6.1 Internal factors impacting sustainable practices

Fan et al. (2023) state that internal factors that influence the adoption and maintenance of sustainable practices are those that occur within the business's boundaries. These factors relate to the profitability of the organisation, stakeholder satisfaction and business processes. According to Tumpa et al. (2019), the core factors impacting sustainable initiatives within an organisation are policy, employee involvement and cost implications of new practices. Ababneh (2021) supports the above statement by stating that employees and organisational policies are core internal driving forces of sustainability within an organisation. Sureeyatanapas et al. (2018) state that although there are a number of factors that impact sustainable practices internally, an organisation must prioritise the most impactful contributing factors to maximise the performance of their sustainable initiatives. According to Martínez-Peláez et al. (2023), Sohns et al. (2023) and Sweeney (2020), there are three internal factors that impact sustainable practices, which are organisational policy, employee involvement and cost implications associated with the adoption of sustainable practices.

Sohns et al. (2023) identify that organisational policy directly impacts the adoption of sustainable practices. Policies form the basis for organisational framework and guide business processes. According to Sönnichsen and Clement (2020), if the organisational policy is aligned to promote sustainability, business processes are then obligated to uphold responsible environmental behaviour. Lăzăroiu et al. (2020) argue that this is rarely the case as most organisations align business policy to promote profit generation, which, in most cases, is the core aim of the business. Pellegrini et al. (2018) suggest that modern organisations have become more sustainably responsible and adapted their current policies to promote responsible environmental behaviour. According to Leipold et al. (2019), the creation of environmental policy forms the foundation of the adoption of sustainable practices and ensures that the organisation meets its regulatory obligations. The benefits of adopting an environmental policy are that it ensures that an organisation remains within its legal boundaries with regard to environmental performance, improves the dissemination of information for employees about environmental roles and responsibilities, reduces incidents that result in liabilities, conserves raw materials and energy, improves cost control, improves the monitoring of environmental impacts and improves the efficiency of business processes (Leipold et al., 2019). Cury et al.

(2023) state that environmental policy can only be established when an organisation assesses the impacts that it has on the environment through its business process. Khan et al. (2019) suggest that when environmental impacts are quantified, an organisation can determine the methodology that can be used to reduce or mitigate negative environmental impacts. Oppenheimer et al. (2019) support the above statement by stating that environmental policy is unique to an organisation and cannot be generalised as the environmental impacts of organisations vary. Oppenheimer et al. (2019) further state that the environmental policy of an organisation should expand with the scope of the business and must be reviewed on an annual basis to ensure that it is relevant. Burns et al. (2020) highlight that poor environmental policy can serve as a barrier to the adoption of sustainable practices and motivates that it is a critical element within any organisation as it guides business processes concerning environmental framework.

Employee involvement and awareness within sustainable practices are often a necessity within an organisation, as employees are charged with the execution of business processes (Martínez-Peláez et al., 2023). According to Neirotti (2020), employee involvement in sustainable practices improves the success rate of current initiatives and the adoption of new practices. Manuti et al. (2020) state that the involvement of employees in sustainable practices improves the performance of these practices and increases employee satisfaction. Mashala (2018) supports the above statement by stating that employee involvement improves innovation, reduces employee turnover, improves employee morale, increases productivity, and improves retention and talent attraction. Li et al. (2019) argue that the benefits that are involved with employee involvement can only be realised if the employees understand the benefits and liabilities that are associated with adopting sustainable practices. According to Saeed et al. (2019), employee perception is critical to their acceptance and adoption of environmental practices. Cheema et al. (2020) suggest that employees' perception of sustainable practices and the importance of responsible environmental behaviour is driven by both internal and external forces. Internal influence relates to the initiatives taken by the business to improve employee knowledge of the impacts and benefits of environmental sustainability (Cheema et al., 2020). This is usually conducted through the use of training programmes, guiding policies and standard operating procedures, which explain the impact of business processes and the necessity of sustainable initiatives to mitigate the negative environmental impacts of these processes (Cheema et al., 2020). According to Madanaguli et al. (2022), external forces relate to the personal awareness of an employee based on their experiences. Chams and García-

Blandón (2019) state that these experiences are driven by factors that directly impact an employee's well-being or community. The exposure of an employee to high levels of pollution and, subsequently, the negative impacts that are associated with this environmental concern would influence their perception of the adoption of sustainable practices that combat pollution (Madanaguli et al., 2022). Yusliza et al. (2020) suggest that due to the large number of external factors that can impact an employee's perception and involvement in sustainable initiatives, it is necessary to develop a robust internal training programme. Al Kerdawy (2019) supports the above statement by stating that organisations should drive employee involvement and perception towards green and sustainable initiatives as these are critical elements to the success of these programmes.

According to Sweeney (2020), the initial costs associated with sustainable practices are higher than those associated with regular business practices, but the cost savings are greater over longer periods of time. It is important to note that the assertions of Sweeny (2020) are generalised across sustainable practices, which should not be the case as it is not a given that cost savings will be achieved by an organisation if they adopt sustainable practices. Agyekum et al. (2021) support this perception by stating that the adoption of sustainable practices into business comes with a financial investment that can be recouped through various savings achieved through the benefits associated with the adoption of sustainable practices. This can be achieved through the improvement of efficiency, reduction in consumption of resources, improved brand recognition, and governmental subsidies (Al Breiki and Nobanee, 2019). Routt (2021) suggests that both business leaders and investors recognise that to create a successful company, there needs to be a commitment to sustainability. Routt (2021: 2) further substantiates this by stating:

> Customers, employees, partners, communities and shareholders all benefit from a commitment to sustainable practices which seek to protect the planet, treat employees with respect, and engage with the community in a positive manner. Return on investment and sustainability go hand in hand, as many sustainable business practices save money by themselves.

Khan et al. (2020) identify the value tradeoff that an organisation must make to reap the benefits of adopting sustainable initiatives. Rasool et al. (2023) suggest that the initial costs or investments are dependent on the initiative or practice that an organisation adopts. These costs can range from new equipment, green technology, training costs, changes to suppliers or any requirements that enable an organisation to develop sustainably (Khan et al., 2020). Cavaleri and Shabana (2018) argue that the initial investment into sustainable practices is far less than the overall benefit of these practices to an organisation. Some of these benefits include financial gains, government subsidies, brand loyalty and innovation opportunities (Cavaleri and Shabana, 2018).

3.6.2 External factors impacting sustainable practices

According to Zameer et al. (2020), there are a vast number of external factors that impact sustainable initiatives within an organisation. These can range from natural disasters and poor environmental conditions impacting business processes to energy shortages and water shortages influencing employee absenteeism (Zameer et al., 2020). Rosati and Faria (2019) state that external factors are a common interference that impacts sustainable initiatives across all industries. Shad et al. (2019) argue that although external factors cannot be controlled by an organisation, their impact can be mitigated or reduced through organisational countermeasures. Some of the core external factors impacting the adoption of sustainable practices are government regulations, population growth, the impact of pollution and environmental degradation on business performance and the costs associated with the adoption of sustainable practices (Al Breiki and Nobanee, 2019; Deb, 2019; Denchak, 2018; Glencross et al., 2020; Janatyan et al., 2021; Khan et al., 2020; Lutfi et al., 2023; Sweeney, 2020).

Sustainable development is an initiative that has been put in place to guide governments in the implementation of policy to ensure that economies focus on developing in a way that protects the environment and society so that future generations can share the quality of life that current generations currently experience (Asongu and Odhiambo, 2019). According to Ziolo and Ghoul (2019), government regulations, policies and taxes play a prominent role in the adoption of GSCM and sustainable practices. According to Torres-Delgado et al. (2023), although regulations are often set by the national government, the monitoring of these regulations often remains on a provincial government level. Wu (2023) states that the monitoring process by the provincial government is critical as it is focused on identifying organisations that have not adhered to government regulations and policies. Sun et al. (2023) argue that although provincial governments ensure compliance, it is the local government structures that monitor environmental compliance and performance of organisations. Trevisan et al. (2023) state that local governments and municipal authorities are at the forefront of environmental audits and compliance checks and, as such, are the most significant level of government. In the pharmaceutical sector government regulations guide product quality and safety regulations, health and safety regulations, trade agreements, public health policies and compliance requirements (Geraci et al., 2023). South Africa is focused on developing a green economy through various policies and practices. The Department of Forestries, Fisheries and the Environment (2022: 2) identify a green economy as:

> A system of economic activities related to the production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks or ecological scarcities.

The Department of Forestries, Fisheries and the Environment (2022) developed a regulatory framework focused on nine elements. This also aligns with South Africa's green economy programmes identified in Table 3.8.

Table 3.8: Nine areas identified in South Africa's green economy programmes

Key area	Explanation
1) Green buildings and the built environment	The programme includes greening private and public buildings.
2) Sustainable transport and infrastructure	The programme includes promoting non-motorised transport.
3) Clean energy and energy efficiency	The programme includes expanding off-grid options in rural and urban, optimisation for large-scale renewable and localisation and up-scaling solar water heater rollout.
4) Resource conservation and management	This programme includes national payments for ecosystem services, up-scale working programmes, development of infrastructure and ecosystem resilience, an offset programme and improved wildlife management.
5) Sustainable waste management practices	This programme includes waste beneficiation and the development of a zero-waste community programme for 500 000 households.
6) Agriculture, food production and forestry	The programme includes integrated sustainable agricultural production.
7) Water management	This programme includes water harvesting, alternative technology for effluent management, comprehensive municipal water metering (demand-side management) and a reduction in water losses during agriculture, municipalities and mining.
8) SCP	This programme includes the development of industry-specific production methods and changes to industrial production technology.
9) Environmental sustainability	This programme includes the greening of large events and better skills development, research, awareness and knowledge management.

Source: Adapted from the Department of Forestries, Fisheries and the Environment (2022: 27-29)

The South African government further prioritised the development of a green economy by developing policies and programmes to achieve its sustainable goals. These policies and programmes are identified in Table 3.9.

Table 3.9: South African framework for enforcing sustainable development

Policy/Programme	Description
2009 framework response to the international economic crisis	The South African government urged for the development of incentives for investment in programmes geared at creating a large number of green jobs, such as employment in industries and facilities that are designed to mitigate impacts on the environment and natural systems and the protection thereof.
Government outcomes for sustainable development	• Outcome 4: Decent employment through inclusive economic growth • Outcome 5: A skilled and capable workforce to support inclusive growth • Outcome 6: An efficient, competitive and responsive economic infrastructure network • Outcome 7: Vibrant, equitable and sustainable rural communities and food security for all • Outcome 10: Environmental assets and natural resources that are valued, protected and continually enhanced
New growth path	Setting out critical markers for employment creation and growth and identifying where viable changes in the structure and that character of production can generate a more inclusive and greener economy over the medium to long run.
International resource panel	Efforts to meet the energy efficiency target and renewable energy target.
Industrial policy action plan	Focusing on the manufacturing aspects of the green economy, namely, green industries and industrial energy efficiency. To support broad-based industrialisation, including more advanced manufacturing, encouraging cleaner, lower-energy technologies and green jobs.
Ten-year innovation plan	Indicating that South Africa is well-positioned to lead research on the continent in terms of understanding and projecting changes to the physical system, the impact of these changes and mitigation to limit their long-term effects.
The South African National Framework for Sustainable Development (NFSD)	This is a proactive strategy that regards sustainable development as a long-term commitment, which combines environmental protection, social equity and economic efficiency with the vision and values of the country. The five strategic objectives of NFSD are: • Enhancing systems for integrated planning and implementation • Sustaining our ecosystems and using natural resources efficiently • Towards a green economy • Building sustainable communities • Responding effectively to climate change

Source: Adapted from the Department of Forestries, Fisheries and the Environment (2022: 70-77)

These policies are further emphasised with various taxes that serve as a deterrent to poor environmental performance. Some of the most common taxes imposed to deter industries and consumers from negative environmental elements are identified in Table 3.10.

Table 3.10: Common 'green' taxes in South Africa

Tax	**Implementation date**
Plastic bag levy	2004/05
Incandescent light bulb levy	2009/10
Electricity levy	2009/10
CO_2 tax on vehicle emissions	2010/11
Tyre levy	2016/17

Source: Adapted from Business Tech (2019: 4)

Besides imposing taxes, the South African government has also developed a rebate system to encourage investment into green building and green technologies for both organisations and the general public. New policies, such as the Section 12L energy-efficient savings tax incentive, allow for tax rebates and a reduction in property rates based on the use of clean energy over 12 months. Within South Africa, regulations guiding the pharmaceutical sector are stringent as recent amendments to the Medicines Act replaced the Medicines Control Council (MCC) with the newly developed South African Health Regulatory Products Authority (Narsai et al., 2021). This indicates that the pharmaceutical industry is highly regulated to ensure that best practices are conducted in organisations such as CIPLA.

Janatyan et al. (2021) identify air pollution as a common by-product of the manufacturing processes within the pharmaceutical sector. According to Belkhir and Elmeligi (2019), the pharmaceutical sector is a key contributor to air pollution and generates more emissions than the automotive manufacturing industry in most countries. Air pollution can be identified as the presence or introduction of harmful substances into the air (Madronich et al., 2023). According to Olutola and Wichmann (2020), the presence of air pollution is especially concerning in countries such as South Africa due to its warmer climate. Madronich et al. (2023) further emphasise that air pollution is directly linked to poor air quality and, as such, increases illnesses that are related to the respiratory system. According to Udeagha and Breitenbach (2023), air pollution has been increasing in South Africa, which has led to an increase in respiratory diseases and habitat destruction. This has been identified by Olutola and Wichmann (2020) through a study of communities in KwaZulu-Natal that determined that there were more instances of cases of children with asthma and asthmatic symptoms in areas with high volumes of outdoor air pollution versus those in areas that had little air pollution. Singh et al. (2023) argue that air pollution is not only caused by industry but also includes pollution that is generated by households and transportation. The impact of air pollution is not solely aligned with health concerns but also adversely affects economic productivity (Pandey et al., 2021). According to Liu et al. (2021), air pollution affects the health and motivation of the workforce. An increase in air pollution negatively impacts the workforce, thus reducing economic productivity through lost labour hours (Liu et al., 2021). According to Ngobeni and Kekana (2023), South Africans are becoming more aware of the impacts of air pollution due to the increase in cases of respiratory ailments but much more must be done to create a greater level of awareness. Based on the literature discussed it is evident that air pollution adversely affects the environment, society and the economy.

According to Babuji et al. (2023), water pollution can be identified as the presence of poisonous or harmful substances within a body of water, making it toxic to the environment and human health. Anh et al. (2023) suggest that these substances can come from farms, towns, manufacturing plants and by-products of human activities such as mining. Water is able to dissolve most substances and as a result, is easily polluted. Zeng et al. (2021) support this perception by stating that water pollution adversely affects the environment as pollutants can cause the death of aquatic life due to the ecosystem being a complex chain of various interrelated organisms. This can occur from algal blooms, the contamination of waterways with chemicals and heavy metals, acidification as well as marine debris (Zeng et al. 2021). According to Arienzo and Donadio (2023), pharmaceutical products are a contributor to water pollution as a result of both pharmaceutical ingredients and microplastics entering waterways. Arora (2018), Denchak (2018), Raha et al. (2021) Zheng et al. (2022) identify three major impacts of water pollution, these are:

- Algal bloom occurs when water pollution causes nutrients to stimulate plant and algae growth which reduces the amount of oxygen in water sources (Zheng et al., 2022). This then results in water bodies that are devoid of life and can even cause the release of neurotoxins that can affect wildlife (Zheng et al., 2022).
- Chemicals and heavy metals can also contaminate waterways and are toxic to aquatic lifeforms, and this can result in the death of the lifeform or contamination (Arora, 2018).

In some instances, toxic substances are passed on from one life form to another in the food chain resulting in the accumulation of toxic substances (Arora, 2018).

- Marine debris occurs when human waste products pollute bodies of water, which adversely affects marine life (Raha et al., 2021). Solid debris such as packets and plastic bags can strangle, suffocate, and starve marine animals resulting in death (Raha et al., 2021).

According to Wöhler et al. (2023), the pharmaceutical sector contributes significantly to water pollution through the poor disposal of pharmaceutical products and by-products of pharmaceutical manufacturing processes reaching waterways. Water pollution can be fatal to humans and caused 1.8 million deaths in 2015, according to a study published by Landrigan (2017). The study suggests that water pollution is more dangerous to low-income communities that have little or no access to clean water. This makes countries such as South Africa more at risk of being impacted by water pollution than developed countries (Landrigan, 2017). According to Jurbe et al. (2023), another concern is waterborne pathogens in the form of disease-causing bacteria that can arise from human and animal waste. Adejumoke et al. (2018) state that some of the most common diseases include cholera, typhoid and giardia, which are extremely harmful to humans. According to Kordbacheh and Heidari (2023), some of the effects of water pollution by pharmaceutical products include habitat destruction and the death of aquatic fauna and flora. Babuji et al. (2023) argue that pharmaceutical waste in waterways also poses a significant threat to human life as it can cause toxicity in waterways and potential antimicrobial resistance (AMR). Jurbe et al. (2023) argue that water pollution is dangerous to both human life and the environment. Quon and Jiang (2023) and Sgroi et al. (2018) propose the cost savings that are achieved from the reuse of water are also key drivers toward the reduction of water pollution. Anjum et al. (2023) suggest that as the world's clean water resources diminish due to overuse, pollution and droughts, the protection of this precious resource has become more important than ever to society. This has seen the rise of sustainable practices such as water reuse, improved purification methods and the protection of water resources from human activities in the form of government policies (Marron et al., 2019).

According to Bharti and Bora (2023), the pharmaceutical sector is responsible for land pollution through the improper disposal of pharmaceutical products by manufacturing sites. Al Smadi et al. (2023) state that a significant portion of pharmaceutical products and byproducts can be found in landfill sites. These pollutants can be in the form of expired medication, packaging materials and rejected medication (Smadi et al., 2023). Sathya et al. (2023) state that it is of critical importance to better manage pharmaceutical waste if societies are to pursue a sustainable future. According to Al-Brakat et al. (2023), the adoption of green supply chain initiatives is critical to reducing land pollution within the pharmaceutical sector. Okoro et al. (2023) argue that the pharmaceutical manufacturing process involves chemicals and solvents that are much more harmful to the environment as opposed to normal land pollutants as these chemicals can contaminate land and damage ecosystems in various ways. Yuan et al. (2023) support the insights provided by Okoro et al. (2023) by stating that pharmaceutical products have been identified to cause genetic defects in fauna and flora.

According to Acharjee et al. (2023), waste that is created by the pharmaceutical industry in the form of microplastics and packaging is a core contributor to land pollution which impacts the environment adversely. Takunda and Steven (2023) concur with Acharjee et al. (2023) by stating that solid medical waste and pharmaceutical packaging directly impact the environment and soil quality. According to Sun et al. (2023), land pollution can be defined as the presence of one or more contaminants on land, and this can include the presence of toxins within the soil or other elements that threaten the safety of the environment or compromise human health. Artiola et al. (2019) support the definition provided by Sun et al. (2023) by stating that land pollution is the deterioration of the Earth's surface both below and above ground level. This type of pollution occurs when waste is not properly disposed of and even as a result of poor farming practices (Jin et al., 2018). Stange et al. (2021) state that this pollution directly impacts both humans and wildlife. Pazikowska-Sapota et al. (2020) argue that pesticides and herbicides are also significant contributors to land pollution as they can lead to habitat destruction and modification. Raza et al. (2019) identify that the effects on human health can include dermatological, gastrointestinal, neurological, carcinogenic, respiratory, reproductive, and endocrine impacts. Artiola et al. (2019) suggest that this type of pollution can contain both hazardous and non-hazardous waste. According to Shah et al. (2021), some of the key negative impacts of land pollution are the negative impact on human health, soil pollution, air pollution, water pollution and environmental degradation. In South Africa, land pollution is an area of concern, according to the Association for Water and Rural Development (2019: 1):

> South Africans dispose of enough municipal solid waste to fill an entire football field 10 metres deep, every day. Every single person in our total population of 57 million generates up to 2.5 kilograms of waste per day, on average, depending on his or her level of income. The disposal of such waste at properly licensed and regulatory-compliant sanitary landfills is generally accepted as being a safe and economical option throughout the world.

Adeleke et al. (2021) identify that South Africa needs to transform from a linear economy to a circular economy to reduce the amount of municipal waste produced. This correlates with assertions by Kim (2021) and Sharma et al. (2021), who identify that linear economies are no longer feasible as the severity of climate change is currently growing at a rapid pace. Kim (2021) argues that circular economies are more common in developed countries as there is a higher level of accountability as opposed to developing countries that do not always have policies in place to prevent linear economies. However, this cannot continue as climate change effects are also more severe on developing countries as they are not equipped to handle natural disasters and other negative impacts as well as developed countries. Synoracki (2019) states that some effective methods used to reduce land pollution are bulk buying, composting, reusing, zero waste initiatives and the adoption of sustainable initiatives by industry. Yousaf and Aqsa (2023) argue that industry must be involved in the drive to reduce land pollution as businesses are significant contributors.

The burning of fossil fuels by pharmaceutical companies is another environmental concern that is a byproduct of the pharmaceutical manufacturing process and supporting supply chain operations, according to Firth et al. (2023). In South Africa, the use of fossil fuels is the most common method used to transport raw materials and finished products between manufacturers, suppliers and distributors within the pharmaceutical industry (Hamann, et al., 2023). According to Malla et al. (2023), the burning of fossil fuels is a common method used for energy generation globally. Many countries have moved away from the burning of fossil fuels to generate power and adopted alternative sources due to the harsh negative impact that it has on the environment (Malla et al., 2023). Gao et al. (2019) state that the pharmaceutical sector is very energy extensive and, as such, directly impacts environmental degradation through the burning of fossil fuels. In South Africa, coal is the primary source of electricity generation, which is considered a fossil fuel. According to Sati and Verma (2021), fossil fuels can be identified as coal, crude oil and natural gases as they have been formed from the fossilised remains of animals and plants that were buried millions of years ago. As such, they have a high level of carbon content within them, and when they are consumed, they release these high levels of carbon content into the atmosphere (Denchak, 2018). Some of the most common negative impacts of fossil fuels are:

- Land degradation is a result of the unearthing processes which cause large-scale habitat destruction due to drilling/ mining, establishing pipelines and roads as well as various other processes (Xie et al., 2020). This can cause widespread habitat destruction that is irreparable even after operations have ceased (Xie et al., 2020).
- Water pollution is caused by various elements such as acid spillages during the extraction process, oil spillages during transportation and the build-up of sediment in waterways as a result of excavation (Denchak, 2018; Su et al., 2019). Fossil fuel companies are also the key contributors to water pollution through incidents such as oil spills and explosions that adversely affect the environment and human health (Donaghy, 2021). Purwendah et al. (2019) state that the effects of failures such as oil spills can be felt over many years through the death and destruction of aquatic life and ecosystems.
- Air pollution occurs during the burning of fossil fuels that have high carbon emissions. Air pollution that comes about from the burning of fossil fuels can cause acid rain as well as respiratory disorders in animals and humans (Denchak, 2018; Rahman and Thurston, 2020). According to Donaghy (2021), fossil fuel companies also contribute to the generation of dangerous air pollutants such as soot (fine particulate matter) and smog, which increases the risk of heart disease, lung cancer and other respiratory illnesses.

Plantinga and Scholtens (2021) identify that although the burning of fossil fuels is common practice, a portion of the reserves of fossil fuels should be left unused so as not to exceed the threshold. However, because the burning of fossil fuels directly impacts climate change and ultimately increases global temperature, it is essential that alternate fuel sources be identified, and the change to clean energy be made (Plantinga and Scholtens, 2021). Kabir et al. (2023) suggest that if the burning of fossil fuels is not reduced and ultimately stopped, there will be dramatic changes to the climate that will adversely affect all of the living organisms on Earth. Faisal et al. (2021) suggest that there is a direct link between the amount of fossil fuels burnt and population growth. The motivation behind this assumption is that as the population grows, the demand for energy increases as well to meet the growing needs. According to Majeed et al. (2023), fossil fuels are one of the most commonly consumed types of energy as it is easily accessible and the current setup costs for clean energy, such as hydroelectric energy, are high. According to Ateba et al. (2019), South Africa is currently one of the world's largest contributors to carbon emissions. Winkler (2020) states that in South Africa most of the power generated through the national power grid is done through the use of coal or the burning of fossil fuels. The energy market in South Africa is led by a public entity known as Eskom, which focuses on servicing the power requirements of the country (Winkler, 2020). Gunjyal et al. (2023) suggest that fossil fuels have a lasting negative effect on both human health and the environment and, therefore, directly impact sustainability. Rahman and Thurston (2020) further support this perception by stating that to improve sustainable development, alternate methods of energy need to be used as a replacement for fossil fuels. Filho et al. (2020) suggest that although the initial investment cost for alternative energy sources is high, the value and cost savings over time far outweigh the start-up costs. The value is, therefore, twofold as environmental impact is reduced and costs are also reduced.

Espinoza (2020) identifies hazardous waste as waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. According to Biswas et al. (2023), some of the most common wastes are chemicals, medical waste and electronic waste. Fazzo et al. (2017) state that the effects of hazardous waste are often felt in countries with poor waste management systems, such as African and Asian countries. Fazzo et al. (2017) further explain that in African countries, large amounts of waste can be found in illegal dumpsites, and the contents of that waste can often be found in streams of soil. Bonnet et al. (2023) suggest that the long-term effects of hazardous waste can be felt even if it is disposed of at landfill sites. The motivation is that chemicals can find their way to underground waterways and eventually lead to human exposure. According to Bonnet et al. (2023), some of the impacts of hazardous waste on human health are behaviour abnormalities, cancer, physiological malfunctions, genetic mutations, physical deformations and birth defects. The risk of pharmaceutical by-products as hazardous waste is gaining popularity as a key concern for human health. Mishra et al. (2019: 104) state:

> Pharmaceutical and personal care products are a class of emerging pollutants that has recently gained attention due to their ubiquitous presence and biological activities, including antibiotic resistance and its effect on the endocrine system. This class of contaminants mainly enters waste streams from biomedical, domestic and industrial rejects from the pharmaceutical and cosmetic industry.

According to Kolawole and Iyiola (2023), the damage caused by human waste is also strongly felt by the environment as it can destroy ecosystems and cause widespread environmental degradation (Nwankwo et al. 2020). Xu et al. (2018) support this argument by stating that the toxins from chemical by-products can be found in soil, plants, waterways and the air. Nwankwo et al. (2020) state that certain chemicals, such as mercury, can also be transferred from one organism to another, which ultimately results in long-term environmental concerns. According to the Association for Water and Rural Development (2019: 2):

> South Africans generate roughly 54.2 million tons of general (municipal, commercial, and industrial) waste per year. Of these 54.2 million tons of waste, a maximum of only 10% is recycled or recovered for other uses, whilst at least 90% is landfilled or dumped. Approximately 94% of the 48 million tons of hazardous waste generated in 2017 was also directed to landfill sites. Hazardous waste types include mercury-containing, asbestos-containing, brine, fly ash, waste oils, sewage sludge and materials considered miscellaneous waste. These hazardous wastes generate a wide range of toxins that are hazardous to the environment and human life and need to be carefully treated according to strict hazardous waste regulations.

According to Newsome (2020) and Van den Honert et al. (2018), the need for the protection of the environment is increasingly important to countries such as South Africa that rely on their tourism industry for revenue. This is supported by Jong et al. (2022) who highlight that South Africa is dependent on the tourism industry as a developing country and is especially important in combating the high levels of unemployment. Van den Honert et al. (2018) suggest that the reduction of hazardous waste by industry is necessary for the South African tourism industry to thrive for the foreseeable future. According to Xaba and Mgutshini (2023), hazardous waste that is formed from medicinal waste that is incorrectly disposed of has a severe impact on a number of communities in South Africa. Ramesh et al. (2023) state that pharmaceutical waste very often pollutes waterways if they are disposed of incorrectly, which results in the complete habitat destruction of various water sources and directly impacts the health of those that rely on them for sustenance. According to Moghaddam et al. (2023), pharmaceutical companies often create sludge when disposing of their waste, which is when a number of expired or waste byproducts are mixed and combined with water to create a mass of pharmaceutical waste. This is often done to dispose of this waste, which can be through landfill sites, ocean disposal or incineration (Moghaddam et al., 2023). According to Sapkota and Pariatamby (2023), incineration is the most sustainable method to dispose of pharmaceutical waste as it drastically reduces the impact that it has on the environment. Fetta et al. (2023) concur with Sapkota and Pariatamby (2023) by stating that incineration, although costly, is the best method of pharmaceutical waste disposal.

Population growth is the increase in population over a period, which is directly impacted by the number of births and deaths (van Doren, 2023). According to Cho and Bauer (2019), growth occurs when the number of births is larger than the number of deaths in a population over a given period. Population growth directly impacts the number of resources available in a given ecosystem (Ahmadalipour et al., 2019). According to Everson et al. (2023), population growth directly impacts the demand for medications, which places a strain on manufacturing and distribution channels that leads to an increase in supply chain complexity. Khan et al. (2023) suggest that the more complex a supply chain is, the harder it becomes to implement sustainable initiatives. Therefore, the larger the amount of population growth, the greater the constraints on pharmaceutical supply chains and manufacturers (Cho and Bauer, 2019). According to Rosenberg (2021), population growth directly affects sustainable development as there are limited natural resources that are available on the planet. Therefore, unrestrained population growth is not sustainable. Rosenberg (2021) identifies six effects of population growth:

1) Social friction is limitations brought about by constraints in resources and will cause issues such as crime and xenophobia to arise.
2) Health impacts refer to reduced human health due to the rise of diseases and malnutrition.
3) High level of traffic congestion increases the levels of pollution.
4) Overconsumption of resources will cause greater levels of pollution on land, sea and air.
5) Depletion of ecosystems as a result of over-utilisation.
6) Habitat destruction is a result of the creation of housing and urbanisation.

Almulhim and Cobbinah (2023) support the perception that sustainable development is negatively impacted by population growth by stating that this phenomenon increases carbon emissions, food production and energy consumption, which in turn reduces environmental sustainability. Rosenberg (2021) states that if this trend continues, the planet will become unstable, and this will impact all pillars of sustainability adversely.

According to Shebitz et al. (2023), deforestation is a factor that directly threatens the pharmaceutical industry as it leads to habitat destruction and the loss of medicinal plants and biodiversity, which impacts research and development initiatives. Freire et al. (2023) argue that deforestation has severely impacted the access to pharmaceutical products in countries such as Brazil as it resulted in reduced access to critical raw materials that are necessary in the manufacturing process. Therefore, deforestation directly impacts pharmaceutical supply chain performance as it can create bottlenecks in production due to shortages in raw materials (Freire et al., 2023). According to Inatimi (2023), deforestation can be identified as the destruction of forests and trees to repurpose land for other activities. This is generally a human activity and negatively affects the climate, ecosystems and biodiversity (Pendrill et al. 2019). Forests are home to a variety of fauna and flora, and the destruction of forests, therefore, puts these organisms at risk (Duku and Hein, 2021). From a broader perspective, the destruction of these forests can have an even more dire impact on ecosystems as a whole. All organisms within an ecosystem share an interrelated relationship, and the destruction of habitat may have a rippling effect on various other species in an area (Duku and Hein, 2021). According to Youmatter (2020), the three main causes of deforestation are:

- Approximately 80% of deforestation is caused by the development of agricultural land for farming livestock and crops. Large amounts of forest areas are cut down to create agricultural land to increase food supply to meet the growing human population.
- Approximately 15% of deforestation is a result of new constructions and developments to facilitate human lifestyles. The expansion of housing and human facilities are key contributors as they require large amounts of forest land to be cleared.
- The movement of people towards urban areas contributes approximately 5% towards deforestation. As more people relocate toward urban areas, the boundaries of those areas begin to increase, resulting in forest destruction.

Another key concern surrounding deforestation is that it contributes to climate change due to increases in the number of gases, such as carbon dioxide, in the air (Orewere et al., 2022). According to Onyili et al. (2023), trees play a pivotal role in the ecosystem as they reduce the amount of carbon dioxide in the air. Therefore, reducing the number of trees will result in an increase in carbon dioxide and, therefore, impact climate change (Orewere et al., 2022). Shebitz et al. (2023) state that deforestation negatively impacts pharmaceutical supply chains and the environment and, therefore, has to be addressed and managed by governments and industry to ensure a sustainable future.

3.7 Supply chain management

The discipline of supply chain management has grown in popularity for both businesses and within the spectrum of academics. The function of supply chain management within an organisation encompasses key operational aspects such as transport, warehousing, procurement and planning, therefore, making it not only a core operational activity but also a tool to improve competitive advantage. Supply chain management is a critical concept in the context of this study because the discipline of logistics falls under the blanket of operations known as the supply chain. The concept of supply chain management is examined by reviewing a number of definitions by various authors. To establish a holistic understanding of the concept of supply chain management, definitions put forth by various authors were reviewed. According to Handfield (2020: 1):

> Supply chain management is the active management of supply chain activities to maximise customer value and achieve sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective and efficient ways possible. Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

Another definition provided by Perkins and Wailgum (2017: 3) states that "supply chain management enables enterprises to source the materials necessary to create a product or service and deliver that product or service to customers".

According to the Chartered Institute of Procurement and Supply (2021: 2):

> Supply chain management is the handling of the flow of goods and services from the raw manufacturing of the product through to consumption by the consumer. This process requires an organisation to have a network of suppliers (that serve as links in the chain) to move the product through each stage.

Fernando (2020: 1) provides a similar view set by the Chartered Institute of Procurement and Supply (2021) by stating:

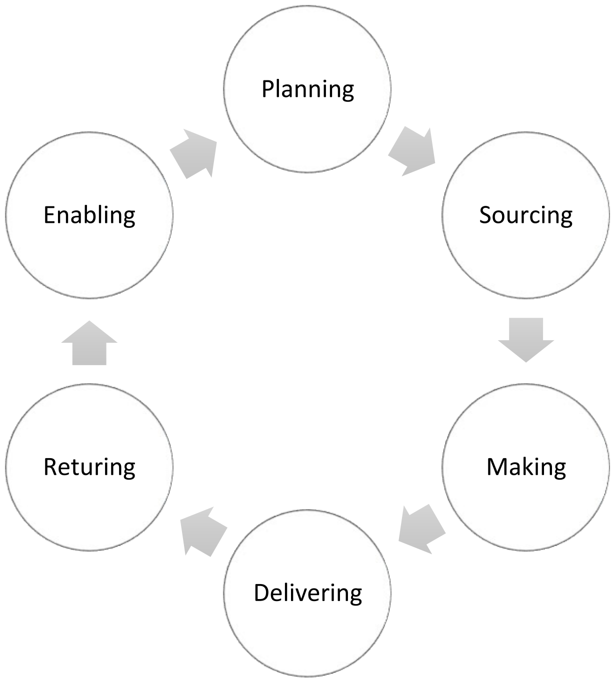
> Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials into final products. It involves the active streamlining of the business's supply-side activities to maximise customer value and gain a competitive advantage in the marketplace.

Handfield (2020) states that in every supply chain, there are two types of flows, namely, physical and information flows. According to Pereira et al. (2023), physical flows encompass the movement, storage and transformation of goods and materials. Information flows facilitate the various supply chain partners to coordinate the long-term plans as well as control the daily flow of materials up and down the supply chain (Handfield, 2020). Monczka et al. (2017: 5) argue that "supply chain management is a strategic approach to planning for and acquiring the organisation's current and future needs through effectively managing the supply base, utilising a process orientation in conjunction with cross-functional teams to achieve the organisational mission".

For the purpose of this study, the definition provided by the Chartered Institute of Procurement and Supply (2021) is used as they are the regulating body for the discipline in South Africa and is supported by various other authors such as Cordell and Thompson (2019), Fernando (2020), Layaq et al. (2019) and Motaung and Sifolo (2023). They have also been at the forefront of supply chain management internationally since 1963 and have gathered knowledge from a number of academics and industry experts (Council of Supply Chain Management Professionals - CSCMP, 2021). The CSCMP (2021: 1), which is the international governing body for supply chain management, state:

> Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.

Supply chain management encompasses a host of activities to achieve its purpose, therefore, to determine the various departments, components of supply chain management were reviewed, which is depicted in Figure 3.6. The departments that are highlighted in Figure 3.6 are linked to the core business processes that an organisation requires to fulfil their business operations in both the service and goods industry, according to Pal (2023).



Source: Adapted from Pal (2023: 479)

Figure 3.5: Six roles of supply chain management

Pal (2023) states that to meet the demand requirements of consumers, an organisation must plan its supply accordingly. Allaoui et al. (2019) state that a supply chain also needs to be designed to ensure that it meets its intended purpose, such as efficiency, effectiveness, delivering value for its customers and achieving enterprise goals. Planning is critical as it sets the precedence for the rest of the operations in the supply chain (Kochakkashani et al., 2023).

To successfully run its operations, an organisation needs to have materials and resources to create products or provide services which are acquired through sourcing (Kjaer et al., 2019). Once suppliers have been selected, managers must monitor and manage suppliers and develop supplier relationships (Kähkönen et al., 2023). Some of the key processes include ordering, receiving, managing inventory, and authorising supplier payments (Kähkönen et al., 2023). Managers are also charged with supporting the operations departments through the receiving of raw materials, manufacturing the product, testing the quality of materials, packaging for shipping and scheduling of deliveries (Perkins and Wailgum, 2017). According to Mahmoudi and Parviziomran (2020), the core element of the supply chain process is to manage the production process and operations to ensure that the business is running smoothly. Delivering is referred to as logistics and involves the coordination of customer orders, scheduling delivery, dispatching loads, invoicing customers, and receiving payments (Karim et al., 2020). This process is carried out by either a third party or the company's fleet (Karim et al., 2020). The process of managing returns from customers to suppliers also falls under the blanket of supply chain management, according to Jahanbakhsh and Amini (2023). Therefore, the supply chain network must be flexible and responsive to take back defective, excess or unwanted products (Julianelli et al., 2020). According to Marttinen et al. (2023), supply chain management is also seen as an enabler as it fulfils a number of support processes, such as monitoring information throughout the organisation and ensuring compliance with all regulations. Enabling processes of supply chain management include finance, human resources, information technology (IT), facilities, portfolio management, product design, sales, and quality assurance (Fourie and Malan, 2020). Likewise, supply chain management enables a host of organisational departments as well, which is based on an organisation's operational structure.

3.8 Functional departments of a supply chain

Supply chain management comprises a number of functional departments that are involved in fulfilling a supply chain's purpose in an organisation. According to Schneller et al. (2023), the individual departments of a supply chain can be different between organisations, but the core purpose of each department remains the same. According to Zekhnini et al. (2020), supply chains handle a number of different business processes that focus on the movement of goods and services, sourcing of goods and services and management of operations. These functional departments are depicted in Figure 3.7.

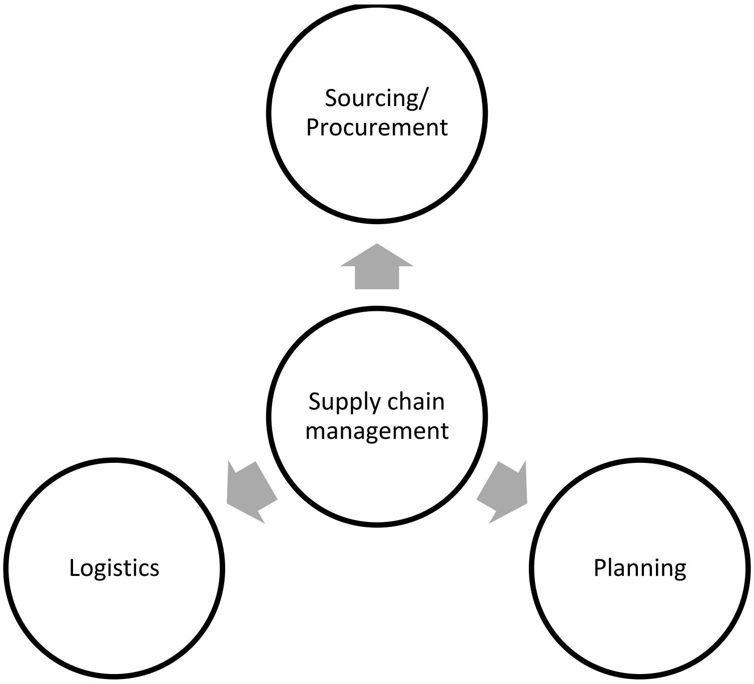


Figure 3.6: Core functional departments of a supply chain

Tiwari et al. (2023) state that supply chain management focuses on a number of operational processes within an organisation that link business processes and drive organisational goals. Al-Brakat et al. (2023) suggest that supply chain management can be identified through its operational processes, which are logistical, operational and sourcing-related. The scope of supply chain management is continuously developing and, therefore, cannot be identified as isolated departments within an organisation (Ketchen and Craighead, 2020). Once material requirements have been determined, the next stage is to source the required materials at the required quantity and quality. Sourcing facilitates the creation of consistent supply chains (Li et al., 2023). The terms sourcing and procurement are used interchangeably in many organisations; however, their meaning differs as procurement involves acquiring goods, inputs, materials and organisational needs, whilst sourcing comprises the entire body of effort that's necessary to build and maintain vendor relations, vetting suppliers, creating and maintaining a supply chain of vendors who are ideal to the organisation's needs (Walts, 2020). Delke et al. (2023) argue that procurement is the complete process of sourcing and encompasses the use of suppliers to gather the materials that are needed by an organisation, whilst sourcing is the preliminary stage for any purchases made by an organisation. Therefore, sourcing is a stage of the cycle, whilst procurement is the entire cycle (Biedron, 2018). The distinction between sourcing and procurement is identified in Table 3.11.

Table 3.11: Processes of sourcing vs procurement

Procurement processes	Sourcing processes
• Identifying requirements • Authorising and approving a purchase request • Identifying suppliers • Making inquiries • Receiving quotations • Negotiating terms • Selecting a vendor • Creating a purchase order and goods receipt • Managing to ship • Receiving invoices • Making payment	• Finding quality sources of goods and services • Negotiating contracts • Establishing payment terms • Market research • Testing for quality • Considering outsourcing for goods • Establishing standards

Source: Adapted from Fournier (2015) and Walts (2020)

The purpose and strategic role of both sourcing and procurement have a direct impact on a business and its ability to operate. The strategic role of sourcing and procurement is depicted in Table 3.12 and Table 3.13, respectively.

Table 3.12: Strategic role of sourcing

Role	Description
Cost management	Strategic sourcing provides benefits for both buyers and suppliers. Buyers can typically negotiate lower unit pricing for high-volume purchasing. This reduces the costs of goods and keeps retail prices competitive. Suppliers benefit because they have a consistent outlet for their goods, which makes planning and cash flow more dependable.
Stability	Both businesses rely on each other to keep the supply chain intact. Developing a close relationship can lead to higher quality (and efficiency) as suppliers and customers work together to identify and minimise the root causes of any defects that hurt both buyer and seller.
Managing risk	Besides identifying and solving problems, a strong relationship built on trust can help mitigate risk. When both parties know they can depend on each other, it opens the door to honest conversation.

Source: Walts (2020: 3-7)

Table 3.13: Strategic roles of procurement

Role	Description
Builds supplier relationships	Developing a purchasing strategy allows companies to develop long-term relationships with suppliers. Better collaboration helps companies to procure products and supplies ahead of their competitors. It also provides an environment that helps suppliers and companies to communicate better and effectively address issues.
Controls inventory	Having control over inventory is important for businesses to address customer demands. Maintaining an inventory that is lower than required results in additional costs for companies and provides less room for newer products. This not only leads to lost opportunities but also decreases sales.
Improves total quality management	Total quality management is one of the most important benefits of implementing purchasing strategies in supply chain management. It allows companies to increase the quality of their products while keeping the cost of supplies in check. The lower the costs companies incur to acquire products, the more they can cut prices to customers without impacting the profit margins of the company.
Optimises suppliers	This means that the suppliers are unable to meet the company standards and terms are discarded. This is one of the fundamental purchasing strategies that companies can abide by to gain financial benefits.
Minimises spend	An effective purchasing strategy allows companies to purchase goods and services at the best price. In addition, a good purchasing strategy provides better visibility into the purchases made by the organisation and shows how the company funds are spent.

Source: Adapted from Spendedge (2019: 1)

Setiawan et al. (2023) state that supplier integration and support are critical in business operations and development. According to Park et al. (2022), a lack of supplier support often is the main cause of the failure of new business strategies such as GSCM. Suppliers support operations both directly and indirectly by supplying products and services that are necessary for the operations of a business (Liu et al., 2021). Park et al. (2022) suggest that for a business to operate successfully for the foreseeable future, it must drive strong supplier relations and align business goals with suppliers.

According to Brau et al. (2023), planning in a supply chain involves several critical decisions ranging from strategically opening a facility to operationally scheduling a task on a particular machine. Raza (2020) argues that supply chain planning is the process of accurately planning the journey of a material or a product right from the raw material stage to the final consumer. This includes processes such as supply planning, demand planning, production planning, distribution planning, operations, and sales planning (Raza, 2020). Planning consists of developing directions to achieve objectives (Allaoui et al., 2019). A definition provided by

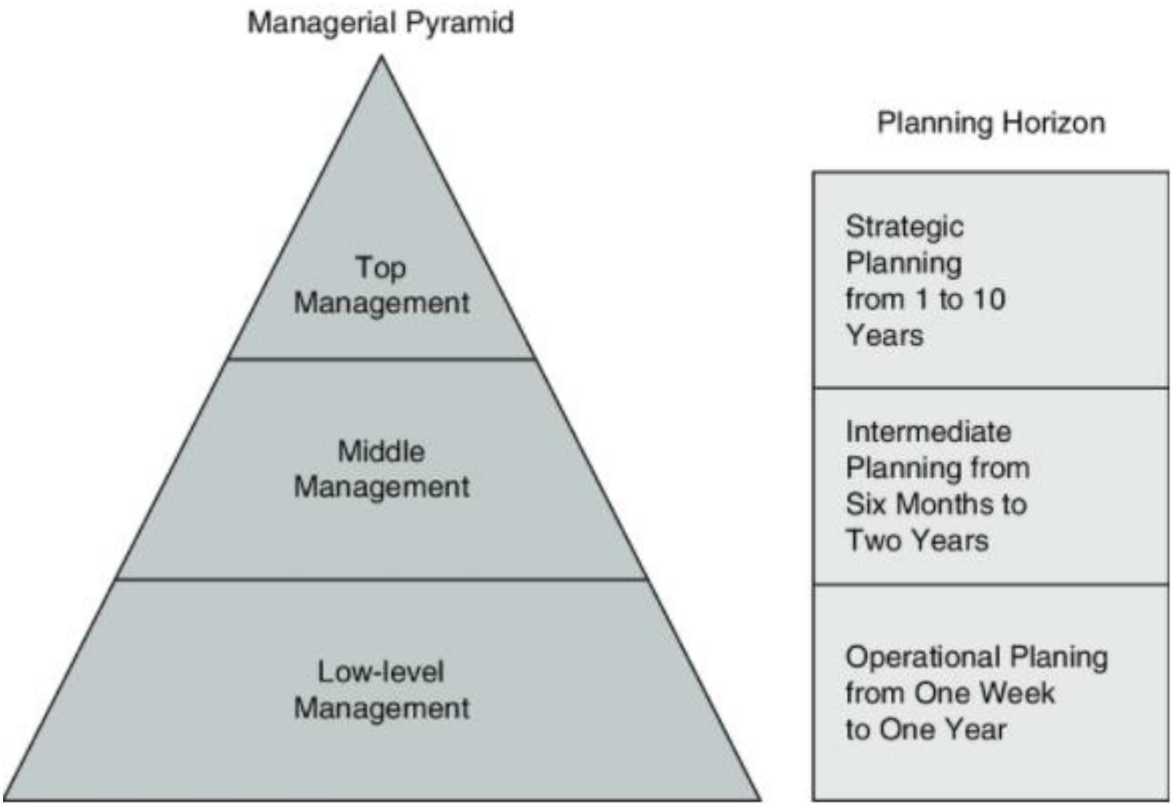
Gartner (2021: 1) is that supply chain planning is "the forward-looking process of coordinating assets to optimise the delivery of goods, services and information from supplier to customer, balancing supply and demand". After a plan is in place, managers must monitor and adjust these plans to adapt to any changes that arise during their execution (Brau et al., 2023). The planning process in a supply chain aims to answer a host of questions, some of which are depicted in Table 3.14.

Table 3.14: Questions to be answered by the planning function

Type of Planning	**Questions**
Supply Chain Management	• How best can an organisation create a fine balance between the inflow or supply of goods and the actual requirement or demand for these goods? • How can it ensure that it is able to meet its set financial objectives? • How can it facilitate the best possible manner in which the requirements can be met from the demand plan created?
Demand Management	• How can an accurate demand forecast help manufacturers directly obtain accurate revenue calculations? • How can it help match appropriate inventory stocks based on demand trends? • How can it help improve the overall bottom line for a particular line of product or service?
Production Planning	• How can the critical aspect of production capacity planning help determine the real on-ground operations on the factory floor? • How can manufacturers go about the appropriate resource allocation of workers? • How best can they schedule for materials along with allocating essential resources and determining the production capacity for a specific unit?
Operations Planning	• How can effective scheduling help outline the timeline and the resources that are necessary to perform and complete the operational analysis? • How can manufacturers go about information collection, including various methods of data collection, depending on the type of operations that the planners want to access? • How can an appropriate gap analysis be performed, which involves performance reporting, identification, cost + benefit analysis and final comparison?
Sales Planning	• How can organisations accurately consider critical aspects like actual sales, product and service marketing, demand coordination, production planning, innovation, new product introduction, overall inventory control, etc. in the final plan? • How can they ensure that final customer demand is effectively met by the organisation's production, distribution, and purchasing processes?

Source: Adapted from Raza (2020: 2)

According to Ashtab et al. (2023), supply chain planning consists of three levels, namely, operational, tactical and strategic, each involved with a different time horizon, planning objective and frequency, which is depicted in Figure 3.8. The movement up the pyramid indicates the level of importance and the corresponding time horizon. The planning decisions made higher up the pyramid in Figure 3.8 have more significant implications as they can impact the business for several years. This also highlights the importance of correctly classifying business decisions that relate to adopting sustainable initiatives as the impact would be dependent on whether the decision is intended to be adopted for the short, medium or long term.



Source: Kaul (2012: 22)

Figure 3.7: Tiers of management

Operational planning has the shortest time horizon and is focused on the day-to-day operations of an organisation and is the concern of departmental managers and supervisors (Thunberg and Fredriksson, 2018). Tactical planning is the focus of middle managers, and this is generally a medium to long-term plan and sets the steps for achieving an organisation's main objective

(Reynders et al., 2022). Strategic planning is the highest level of planning and is conducted by top management, such as the governing bodies and board members (Thunberg and Fredriksson, 2018). Reynders et al. (2022) state that these are long-term plans focused on organisational objectives and policies rather than sectional objectives. Davies (2019) suggests that effective supply chain planning has a direct impact on an organisation’s operations and competitive advantage. The benefits of comprehensive supply chain planning are identified in Table 3.15.

Table 3.15: Purpose of supply chain management

Benefit	Description
Cost reduction	Cost savings gained are due to inventory optimisation, better utilisation of storage space, improved customer responsiveness and improved supplier and distributor relationships.
Improved efficiency	Incorporation of supply chains, innovative product strategies and integrated logistics into planning sessions put the company in a position to predict demand and take appropriate actions.
Increase output	Better planning leads to improved coordination and collaboration with suppliers and supply chain nodes, therefore, facilitating a better product offering.
Better cooperation	Better planning results in improved communication, which allows employees and suppliers to understand the organisation's plans. This ultimately leads to better cooperation between internal and external parties.
Increased profits	The efficiency and productivity of an organisation are directly impacted by planning. Poor planning results in poor organisational performance and vice versa, therefore, good planning improves the business's bottom line through improved order fill rate, inventory costs and cost minimisation.
Eliminate delays	Proper planning reduces delays as each node in a supply chain is aware of its requirements, and this mitigates issues such as logistical errors and production line issues.

Source: Davies (2019: 3-9)

According to the definition of supply chain management by the CSCMP (2020), logistics is a subset of supply chain management. Logistics is the term now widely used to describe the transport, storage and handling of products as they move from the raw material source through the production system to their final point of sale or consumption (Lee and Ha, 2023). Although its core activities have been fundamental to economic development and social well-being for millennia, it is only over the past fifty years that logistics has come to be regarded as a substantial determinant of business performance, a profession and a major field of academic study (McKinnon et al., 2015).

According to Bernardi et al. (2023), the history of transportation and logistics goes back as long as the history of humankind but has been marked by recent milestones. The railroad was discovered at the beginning of the nineteenth century, and the aeroplane in 1903 (Roy, 2023). In maritime transportation, the invention of the sea container is dated 1956 and has impacted sea transport dramatically (Lukasse et al., 2023). In modern times, logistics and the broader concept of supply chain management, are mainly intended as a business function that has the scope to make goods available where and when needed and in the needed quantities (Speranza, 2018). Moons et al. (2019: 205) argue that "logistics is the task of coordinating material flow and information flow across the supply chain to meet end-customer needs". Rodrigue et al. (2017: 339) state:

> Logistics are at the heart of modern transport systems. The term implies a degree of organisation and control over freight movements that only modern technology could have brought into being. It has become one of the most important developments in the transportation industry.

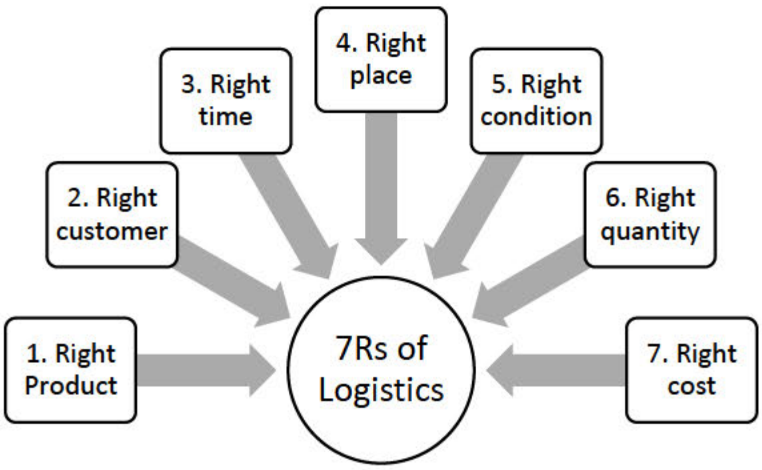
Transportation management can be seen as part of logistics when referring to business processes. However, not only goods but also people need to be transported. In the old times, people used to walk or travel by horse and carriage or ship (Johnson, 2023). According to Roncoli et al. (2023), different transportation means are available currently with different levels of cost and comfort. Traditionally, freight transportation problems have been independent of people's transportation problems (Pilkington, 2020). Moreover, whereas freight transportation is a relevant problem in the private sector, people transportation problems have been mostly - with the exception of airlines - faced by the public sector, which is responsible for the public transportation (mass transit) system and for the design of the infrastructure for the movement of private vehicles (Speranza, 2018). Fleets of vehicles, mainly buses and trains, have needed to be coordinated in terms of routes, schedules, and crew, which has offered fundamental contributions to the optimisation of these systems (Heeswijk et al., 2019).

A critical component of any supply chain is its ability to move and store its products at all stages of its life cycle, and this is the functional role of the Logistics Department. According to Hrouga and Sbihi (2023), logistics is the transportation, warehousing, packaging and other related operations that move and position inventory and acknowledge its role in terms of synchronising the supply chain. Pilkington (2020), Sabell (2021), Szymańska et al. (2017) and

Ukwuani (2023), state that the term logistics was originally military-based and used to refer to the movement of equipment, supplies and troops. This term has developed into a key business concept known as logistics management and is used in many organisations (Pilkington, 2020). The CSCMP (2021: 5) defines logistics management as:

> Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

According to Sabell (2021: 4), logistics can be defined as "the science of obtaining, producing and distributing material and products to the correct place and in the correct quantities". According to Zhou et al. (2023), logistics management is a critical business process as it facilitates the movement and storage of products throughout an organisation's supply chain. Logistics management is also able to create visibility within a supply chain through the use of information systems to gather data on real-time movements (Pilkington, 2020). However, for logistics management initiatives to be successful, an organisation must meet the seven 'R' of logistics, which is depicted in Figure 3.9.



Source: Teoman (2020: 231)

Figure 3.8: 7Rs of logistics

1. The right product refers to product-specific service design with appropriate equipment and resources.

2. The right customer focuses on providing services that meet the requirements of the target market.
3. Right time refers to the delivery of the customer’s order at the scheduled time.
4. The right place is aimed at delivering the customer’s order to the predefined destination.
5. The right condition refers to the delivery of the customer’s order in a safe and good condition.
6. The right quantity suggests that the delivery of the order must be in an amount that will reduce delivery costs and meet the customer’s request.
7. The right cost suggests that the delivery of the customer's order should be made at the lowest possible cost.

Logistics is one of the highest expenditures in a business and, therefore, is a key contributor to an organisation's success. Some of the processes of the Logistics Department are depicted in Table 3.16.

Table 3.16: Logistics processes

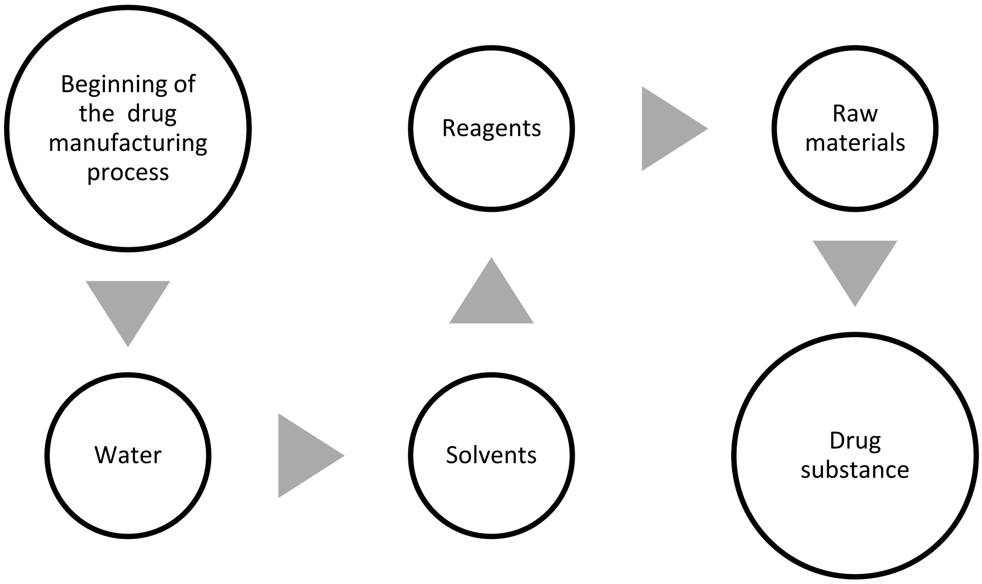
Logistics process	**Description**
Warehouse design and management	This role of logistics in supply chain management covers several tasks at once: from the design of storage facilities to the requirements for storage of products and ending with the introduction of various automation solutions.
The formation of packages	Packaging, tracking and accounting - all of these tasks allow for end-to-end control of goods on the way to the customer or distributor.
Transportation of products	This includes work with cargo carriers and vehicles listed in the company's fleet: planning their routes, calculating fuel costs, etc.
Working with customs	When an enterprise plans international delivery of goods, it is very important that during their transportation, the goods fully comply with customs requirements and contain all the necessary documentation.
Working with intermediaries	Intermediaries in logistics are all third-party, non-company resources that are directly involved in the implementation of supply chains. In turn, finding intermediaries with the most acceptable ratio of quality to cost of services, as well as establishing long-term, reliable relations with them, are also included in the list of tasks for efficient logistics management.
Working with written-off and returned goods	There is also such a thing as ‘reverse logistics’, which establishes the rules and routes for transporting the returned or discarded goods, as well as ways to dispose of them.

Source: Adapted from Gurmak (2021: 2-4)

3.9 Pharmaceutical supply chains

Mukherjee and Goodman (2023) state that the pharmaceutical industry is critical in delivering life-saving products and services to society. According to Milanesi et al. (2020), the pharmaceutical industry entails the discovery, development, manufacturing and distribution of drugs for medical use. The pharmaceutical industry is critical to the longevity of society as new diseases and health-related issues surface every day (Kaisin et al., 2023). However, the pharmaceutical industry is complex and can have a lasting impact on both the environment and society. Kaisin et al. (2023) state that pharmaceutical chemicals are complex, high-value-added products that typically impose significantly larger impacts on the environment per kilogram compared to basic chemicals. Pharmaceutical companies have a long supply chain, meaning that they generally source their ingredients and raw materials either offshore or from suppliers that are further away from their base of operations, as a result, they are known to have global supply chains (Banihani, 2023). In the case of CIPLA South Africa, they also source their raw materials from other countries, which means that they also have a global supply chain.

Innovation is one of the most important factors in this industry and is also one of the largest cost factors (Milanesi et al., 2020). According to Oronsky et al. (2023), the development of new drugs up to the stage where they can be marketed is very lengthy and can take up to a decade or even longer. It is also an extremely costly process and often results in failures during the lengthy process Oronsky et al. (2023). Nidhi (2023) supports this statement by mentioning that pharmaceutical innovation is both expensive and risky and is dependent on patents to protect products. The production phase is also a lengthy stage and consists of many inputs and manufacturing processes. Brechtelsbauer and Shah (2020) and Roschangar et al. (2015) identify some of the inputs that a pharmaceutical product generally consists of in Figure 3.10.



Source: Adapted from Brechtelsbauer and Shah (2020) and Roschangar et al. (2015: 3)
Figure 3.9: Pharmaceutical ingredients

The pharmaceutical industry is a critical component of the healthcare system throughout the world and comprises public and private organisations that discover, develop, manufacture and market medicines for both humans and animals (Löfgren, 2017). According to Kurhekar (2021), the pharmaceutical industry dates back to ancient times with the use of natural medicines created from animals, plants and minerals. In modern times, the pharmaceutical industry focuses on the isolation and purification of compounds, chemical synthesis and computer-aided drug design.

Key sustainable practices within the pharmaceutical sector include eco-product innovation, eco-processes and eco-organisational innovation (Hassan and Daud, 2017). Wang et al. (2023) suggest that eco-product innovation is the introduction of a good or service that is new or significantly improved processes to its characteristics or intended uses. According to Hraiga et al. (2023), the development of eco-processes is when a pharmaceutical company introduces new or re-engineered processes that reduce a company’s impact on the environment. Eco-organisational innovation refers to the changing and upgrading of organisations' management processes through new environmentally-friendly practices (Hassan and Daud, 2017). According to Hassan and Daud (2017: 25), some benefits of these practices are improving “corporate performance by supporting necessary changes, reducing handling and transaction cost, improving workplace and development employee satisfaction and reducing the cost of suppliers". According to Brechtelsbauer and Shah (2020), another common green practice in the pharmaceutical industry is that of green chemistry, which is the promotion of safe, sustainable, and waste-minimising chemical processes. Some of the benefits of using green chemistry include but are not restricted to lower process materials inputs and outputs, reduced costs from hazardous and toxic waste disposal, improved manufacturing capacity utilisation, and reduced energy demand (Brechtelsbauer and Shah, 2020).

According to Suhandi and Chen (2023), there are many ways for materials, products and services concerned with pharmaceuticals to influence the environment. These include improper disposal of pills and tablets by patients, expired and unused medications, and improper release of drugs by pharmacies or household sewage mixed with surplus drugs (Kumar et al., 2019). Pharmaceutical manufacturing is complex in nature and associated with high waste generation and greenhouse gas emissions (Sharma et al., 2020). According to Sharma et al. (2020), researchers have shown that the environmental impact of pharmaceuticals per kilogram production compared to basic chemicals is significantly greater because of the complex chemical formulation involved, which also leads to higher waste per kilogram of product, and consequently higher fossil-fuel consumption. Another concern is the distance between nodes of a pharmaceutical supply chain, and the nature of supply chain products immediately raises red flags with regard to environmental risks due to longer supply chains (de Campos et al., 2017). de Campos et al. (2017) posit that longer supply chains ultimately lead to higher carbon emissions and pollution.

According to Naidu and Ramani (2023), healthcare represents a significant portion of the global economy and directly impacts sustainability across all three pillars, namely, economic, environmental and economic. The impact of pharmaceutical pollution threatens both ecosystems and human health globally (Domingo-Echaburu et al., 2021). Pharmaceuticals can enter the environment at any stage of their life cycle; therefore, they can directly affect water sources, fish and vegetables, to name a few possible concerns (Domingo-Echaburu et al., 2021). According to Huang et al. (2020), residue from pharmaceutical products has been found in drinking water, soil, manure and sewage effluents. The effect of pharmaceutical products can be harmful to the environment even in small dosages, as they can result in the inhibition of reproduction, organ failure, stunting growth and death of both animal and plant life (Huang et al., 2020). One of the key risks to human health is the development of AMR through the discharge of pharmaceutical waste (Patwardhan and Payyappalli, 2018). An antimicrobial is an antibiotic, antiviral, antifungal or antiparasitic pharmaceutical product. According to the World Health Organisation (2020), AMR occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines, making infections harder to treat and increasing the risk of disease spread, severe illness and death. The World Health Organisation (2020) identifies that AMR is one of the top ten global public health threats that currently face humanity.

During the late 1980s, a growing concern regarding the high generation of waste and the use of toxic and hazardous materials in the pharmaceutical and chemical manufacturing industry led to the creation of a term known as green chemistry (Sheldon, 2018). The American Chemical Society (2021: 5) states:

> It is important to note that the scope of these green chemistry and engineering principles goes beyond concerns over hazards from chemical toxicity and includes energy conservation, waste reduction, and life cycle considerations such as the use of more sustainable or renewable feedstocks and designing for end of life or the final disposition of the product.

According to the Environmental Protection Agency (2022: 3):

> Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, use, and ultimate disposal. Green chemistry is also known as sustainable chemistry.

According to Krasnodębski (2023), green chemistry was driven by social movements that were concerned with the environmental impact that companies had on the environment. The development of green chemistry was guided by principles that were established and developed in the 1940s (Adam et al., 2020). To develop a better understanding of green chemistry, the 12 principles of green chemistry depicted in Table 3.17 are important to be considered.

Table 3.17: Principles of green chemistry

Principle	Description
Prevent waste	Design chemical syntheses to prevent waste. Leave no waste to treat or clean up.
Maximise atom economy	Design syntheses so that the final product contains the maximum proportion of the starting materials. Waste few or no atoms.
Design less hazardous chemical syntheses	Design syntheses to use and generate substances with little or no toxicity to either humans or the environment.
Design safer chemicals and products	Design chemical products that are fully effective yet have little or no toxicity.
Use safer solvents and reaction conditions	Avoid using solvents, separation agents, or other auxiliary chemicals.
Increase energy efficiency	Run chemical reactions at room temperature and pressure whenever possible.
Use renewable feedstocks	Use starting materials and feedstocks that are renewable rather than depletable. The source of renewable feedstocks is often agricultural products or the wastes of other processes; the source of depletable feedstocks is often fossil fuels (petroleum, natural gas, or coal) or mining operations.
Avoid chemical derivatives	Avoid using blocking or protecting groups or any temporary modifications if possible. Derivatives use additional reagents and generate waste.
Use catalysts, not stoichiometric reagents	Minimise waste by using catalytic reactions. Catalysts are effective in small amounts and can carry out a single reaction many times. They are preferable to stoichiometric reagents, which are used in excess and carry out a reaction only once.
Design chemicals and products to degrade after use	Design chemical products to break down into innocuous substances after use so that they do not accumulate in the environment.
Analyse in real-time to prevent pollution	Include in-process, real-time monitoring and control during syntheses to minimise or eliminate the formation of by-products.
Minimise the potential for accidents	Design chemicals and their physical forms (solid, liquid, or gas) to minimise the potential for chemical accidents, including explosions, fires, and releases into the environment.

Source: Adapted from the Environmental Protection Agency (2017: 4-6)

According to De Soete et al. (2017), over the past fifteen years, the focus of the pharmaceutical industry has been on developing a tool to improve sustainability. Some of these tools are identified as environmental metrics, such as process mass intensity and atom efficiency, to evaluate the environmental sustainability of chemical synthesis in production (De Soete et al., 2017). In manufacturing packaging, distribution and logistics, and end-of-life cycle disposal have also been under inspection to determine methods to improve sustainable performance (Su et al., 2020).

According to Jalilian (2020: 298-306), some countermeasures to prevent poor environmental performance by companies are:

- Written standards and procedures
- Environmental risk assessments
- Internal and quality audits
- Air emissions, water, and soil contamination controls
- Safe discharge programmes
- Waste management programmes
- Training of staff and suppliers

The use of policy and legislation is a key combatant to poor pharmaceutical practices, and one such policy is International Organisation of Standardisation (ISO) 14000. According to Iso Tracker (2021: 1-5):

> ISO 14000 is a set of international standards covering environmental management systems, environmental auditing, environmental labelling, the assessment of environmental performance and life cycle evaluation. As a follow-up to the standardisation process that was started with the ISO 9000 series, the ISO 14000 series of international standards set the outline on how organisations can integrate environmental considerations into their operations and products. It is a set of voluntary environmental management standards, guides and technical reports, which specifically concentrate on environmental management systems, operating practices, products, and services. The ISO 14000 standards do not propose environmental targets but provide organisations with the tools to evaluate the impact that their activities, products or services have on the environment.

The ISO 14000 series helps organisations identify and limit environmental risks (Karaeva et al., 2023). The standard assists companies with the early identification of risks and focuses on organisations taking a proactive approach to environmental issues (Jannah et al., 2020). According to Lenzen et al. (2020), due to the reach of pharmaceutical supply chains globally, the impact of these chains has a greater impact on the environment, which highlights the importance of control mechanisms such as the ISO series. Esmaeilian et al. (2020) state that sustainable supply chains can only be achieved within the pharmaceutical sector if policy and management standards are aligned.

A significant factor that has impacted pharmaceutical supply chains is globalisation. According to Zbyszewska and Sekalala (2023), the movement towards the globalisation of pharmaceutical supply chains has created better supply chain efficiency and cost reduction, diversification, entrance to new markets, compliance challenges, resilience challenges and longer logistics networks. Vargas-Hernández (2023) states that globalisation has led to the rapid expansion of global supply chains as barriers to trade were reduced by countries and the adoption of new technologies, such as the internet, facilitated the development of relationships between international buyers and suppliers. According to Krishnan et al. (2023), global supply chains are key role players in sustainability as they have a direct impact on the environment, social struggles and the economy. A definition provided by Koberg and Longoni (2019: 84) of global supply chains is: “supply chains that extend beyond a single country's boundaries and, therefore, considered by focal firms that distribute across multiple countries, locate production facilities abroad or source from offshore suppliers”. Williams (2019) argues that global supply chains are the worldwide system that a business uses to produce products or services. Vargas-Hernández (2023) emphasises this by stating that global supply chains are dispersed across multiple tiers in different geographic locations, but this makes them complex, unlike local supply chains.

According to Williams (2019), the creation of global supply chains makes it easier to buy and sell products across the world but reduces the level of control on an organisation's environmental impact. Vandchali et al. (2021) state that a challenge in managing supply chain sustainability is the distance between nodes in a supply chain, such as a buyer and supplier. The reason is that sustainable practices need to be evaluated regularly to ensure that they uphold agreed-upon practices between nodes such as buyers and suppliers (Koberg and Longoni, 2019). A critical aspect of global supply chains is sourcing products from various geographic locations. Table 3.18 identifies the advantages and disadvantages of global sourcing.

Table 3.18: Advantages versus disadvantages of global sourcing

Disadvantages	**Advantages**
Longer lead times as a result of the distance to suppliers. Whilst the production time can be quite quick, the lead time can often be much longer as the goods will require shipping, which can add to the lead time, this means that planning can be a challenge.	Reduced cost price due to lower labour and operating costs linked to the manufacturer of the products.
Risk exposure to modern slavery, brand and financial risk exposure can all be increased.	Supplier development is often possible to support specialist product offerings leading to: • Opportunity to increase innovation • Sharing expertise and upskilling a new market and workforce.
Loss of control of operations. Due to the distance in the working relationship, it can be difficult to manage communications and oversee technical aspects of the production process. Quality issues can also be complex to manage.	Increasing competitive advantage by developing new suppliers will promote access to suitably skilled supply routes.
Fluctuations in exchange rates can cause havoc with material and labour costs. Global markets are more susceptible to regional influences that can impact trading markets.	
Challenges in communication can occur. There needs to be careful consideration of terminology and the type of communication methods used to interface with a global supplier to ensure information is interpreted correctly.	

Source: Adapted from the Chartered Institute of Procurement and Supply (2021: 2-7)

According to Krishnan et al. (2023), global supply chains have improved economic and social sustainability for a number of developing countries. This comes as a result of large organisations outsourcing activities to different low-cost locations, purchasing materials from developing countries as well as opening up the market for developing countries to sell in foreign markets (Arrigo, 2020). Thorlakson et al. (2018: 2072) state:

> Supply chains tied to multinational corporations represent over 80% of global trade and engage over one in five workers. Supply-chain management, therefore, has a significant impact on key social and environmental challenges. Despite this importance, there is currently no comprehensive, empirically grounded understanding of how companies address sustainability in their supply chains.

Healy et al. (2019) argue that global supply chains can cause extensive damage to communities if not managed accordingly. Global supply chains can cause the degradation of the environment through pollution, excessive energy usage, increase in competition for local markets and depletion of non-renewable materials (Arrigo, 2020). Therefore, organisations trading globally have a duty to strictly monitor each node in their supply chain to ensure that it maintains sustainability standards and considerations.

3.10 Sustainable supply chains and GSCM

According to Mughal et al. (2023), over the past two decades, sustainable supply chain management, which is concerned with the integration of environmental, social and economic goals across a focal firm's supply chain processes, has emerged as an approach for firms to improve sustainability (environmental, social and economic) outcomes in their supply chains. Managing sustainability, however, continues to be challenging in global supply chains. From Apple besieged by employee suicides at supplier Foxconn in the early 2000s (Stroumpoulis and Kopanaki, 2022) to Nike struggling with child labour at supplier factories in the 1990s (Koberg and Longoni, 2019) to pharmaceutical companies coming under pressure for waste management practices of their Indian suppliers in 2016 (Upadhyay and Sinha, 2022), supply chain-related sustainability scandals are recurring for firms with global supply chains. Sustainability has become a widely adopted trend for many industries as it attracts customers, reduces the bottom line of a business and ensures the longevity of operations.

Nutburn (2019) identifies five benefits associated with sustainable supply chain management, which can be identified as driving factors of organisations towards sustainability within supply chains. These driving factors are reduced environmental impact of supply chains, improved continuity of supply, protection against reputational damage, the potential for new partnerships and gaining a larger market share (Nutburn, 2019). According to Godbole and Lamb (2023), there is a common misconception that reducing the environmental impact of a business comes at a cost when it can lead to big savings. According to Gawusu et al. (2019), this is achieved by reducing waste and increasing the efficiency of buildings, vehicles and machinery that can yield returns. According to McWilliam et al. (2023), diversification of the supply chain avoids over-reliance on a single link in the chain. Gaffar et al. (2022) suggest that there have been a number of cases over the years of suppliers being unable to fulfil a service or product, which has then had a knock-on effect on other businesses. Having multiple suppliers in different parts of the world can help improve the continuity of products or services, preventing costly downtime and reputation damage (Gaffar et al., 2022). Zhang et al. (2023) state that with information readily available online and through social media, an organisation's supply chain also affects its brand reputation. According to Fernando et al. (2022), it is important to protect an organisation's reputation to enhance business growth. According to Fernando et al. (2022), an organisation's strategy for sustainability enhances the lives of every worker throughout the chain. This includes ensuring fair working conditions, remuneration, minimising environmental impact and limiting unnecessary risk (Nutburn, 2019).

According to Oyedijo et al. (2023), businesses with sustainable supply chains are also an attractive prospect for organisations looking to partner and improve their environmental performance. According to Shashi (2022), an organisation's environmental credentials will likely align with the values of another brand, and this opens up potential partnership opportunities. These partnerships can have a strategic value that greatly increases the performance of an organisation and even drives growth in market share (Shashi, 2022). Zhou et al. (2023) suggest that a sustainable supply chain can create more business opportunities as companies prove their green credentials. This can be further supported through internationally recognised standards, such as those by the ISO (Nutburn, 2019). According to Ong et al. (2022), a common requirement in business tenders is ISO 14001, which is a management system that helps identify gaps in a business where green efficiency savings could be achieved. With accreditation to support environmental efforts, an organisation shows potential clients that they are taking essential strides to reduce their impact on the world (Ong et al., 2022). According to Nguyen et al. (2022), taking positive action can lead to big savings and better profit margins, along with reducing the damage that is done to the planet. Epstein et al. (2018: 21) identify the importance of incorporating sustainability into operations by stating:

> Sustainability cannot be managed as just a public relations strategy to pacify stakeholder concerns. Doing so can be quite risky as stakeholders expect actions and results to be consistent with rhetoric. Furthermore, it is only through the identification, measurement, and management of sustainability impacts that social and environmental and financial performance can be improved and value created. For sustainability to be valuable to both the organisation and its stakeholders, it must be integrated into the way a company does business.

According to Ojijo (2023), the rise of sustainable supply chains and GSCM came about as a result of the deteriorating environment that can be seen in the changing biodiversity and rise in global warming. Qian et al. (2023) suggest that the impact of these environmental issues was felt by organisations, governments and society as a whole. As a result, the development of sustainable organisations has come about to ensure that organisations can operate in a way that reduces their social and environmental impact whilst staying economically relevant (Ojijo, 2023). This has given rise to 'green' operations such as GSCM, which is focused on integrating sustainability into critical business processes. According to Herbon and Tsadikovich (2023) and Tseng et al. (2019), organisations need to focus on achieving sustainable objectives as they have a vital role to play in improving the external environment; this movement is known as 'going green' and is, therefore, the premise for the creation of GSCM. This would suggest that GSCM is the realignment of supply chain objectives to incorporate sustainable practices whilst meeting key operational tasks (Srivastava, 2022). Zaid et al. (2018: 965) define GSCM as "the process of using environmentally-friendly inputs and transforming these inputs into outputs that can be reclaimed and re-used at the end of their life cycle, thus creating a sustainable supply chain".

Khan (2018: 8) concurs by stating that GSCM:

> …refers to the idea of integrating sustainable environmental processes into the traditional supply chain. This can include processes such as supplier selection and purchasing material, product design, product manufacturing and assembling, distribution and end-of-life management. Instead of mitigating the harmful impact of business and supply chain operations, the green supply chain involves value addition and/ or value creation through the operations of the whole chain. Undeniably, reducing air, water and waste pollution is the main goal of the green supply chain, while green operations also enhance firms' performance in terms of less waste manufacturing, reuse and recycling of products, reduction in manufacturing costs, greater efficiency of assets, positive image building, and greater customer satisfaction.

According to Das et al. (2021: 52), the term GSCM:

> …incorporates sustainability concepts into traditional supply chain management. The goal is to help industries reduce their carbon emissions and minimise waste while maximising profit. Every area of the supply chain has room for green improvements, from manufacturing and purchasing to distribution, warehousing, and transportation.

Islam et al. (2023) and Abdel-Baset et al. (2019) suggest that GSCM has grown in popularity among the academic community and industry as a result of the pressures from the government, stakeholders and society. The two driving mechanisms identified by Abdel-Baset et al. (2019) are government policy and increased public awareness, which have driven the narrative of improving environmental performance and practices. To achieve this in a supply-chain context, an organisation must adopt GSCM initiatives, which have been highlighted as a key term for the 'greening' of the supply chain as noted by Islam et al. (2023). According to Zarbakhshnia et al. (2020), green logistics initiatives face a number of difficulties as they aim to achieve sustainability across each of the pillars of sustainability. The concept of the use of sustainable practices in a supply chain has been an area of interest for a number of academics. Ponte et al. (2023) share another view of the movement toward sustainable supply chains and state that organisations are changing based on the needs of both their internal and external environment, and this is the key to continuous development and organisational success. This is supported by Koberg and Longoni (2019), who state that one such change has been the increase in accountability that has been placed on organisations based on the environmental, social and economic impacts caused by both their operations and those of their suppliers. This has given rise to the phenomenon known as sustainable supply chain management, which is focused on integrating a firm's operations with environmental, social and economic goals to improve overall sustainability. Koberg and Longoni (2019) discuss a concept known as 'sustainable outcomes', which is considered to be the focus of a sustainable supply chain. According to Koberg and Longoni (2019: 1084), a sustainable outcome is defined as "encompassing the adoption of environmentally and socially responsible practices as well as the achievement of environmental, social or economic performance". This suggests that the focus of a sustainable supply chain is to ensure that the three pillars of sustainability are upheld. After the analysis of the concepts of sustainable supply chains and GSCM, it is evident that they are focused on achieving the same goal of achieving sustainable operations. This is depicted in Table 3.19, which shows the correlation between supply chain sustainability and GSCM.

Table 3.19: Sustainable supply chain management vs GSCM

Sustainable supply chain management	**GSCM**
Changes based on external environment requirements	Changes based on the need for the improvement of sustainability at an organisational level
Key focus on improving organisational performance through the use of sustainable techniques and initiatives.	Key focus on the improvement of organisational sustainability whilst ensuring that business processes are upheld and improved upon.
Primary areas of improvement: ▪ Economic sustainability ▪ Environmental sustainability ▪ Social sustainability	Primary areas of improvement: ▪ Economic sustainability ▪ Environmental sustainability ▪ Social sustainability

Source: Adapted from Koberg and Longoni (2019: 1084-1085)

The field of GSCM and sustainability has grown in interest amongst the academic community. Over the past five years, the existing body of knowledge on GSCM and sustainable supply chains has grown with the addition of literature across various industries.

3.10.1 Reverse Logistics

According to Hyder et al. (2023), reverse logistics is a component of the logistics process whereby products move backwards from the customer to the supplier. It falls under the discipline of logistics, but being a new field of study, several theories have been put forward by academics to define this process. Zarbakhshnia et al. (2020: 1) identify the term reverse logistics as “the planning and scheduling for the backward flow of products, to be more specifically second-hand goods, from customers and consumers to suppliers and manufacturers for several activities such as repairing, remanufacturing, recycling, disposal and so on”. Sathish (2019: 2) argues that reverse logistics is defined as “the end life of products which is dismantled for the establishment of a new product not by affecting the product value and the organisation's market strategy”.

This is the viewpoint of companies that are involved with the re-manufacturing of products, according to Sathish (2019). The environmental aspect of this view is that by re-manufacturing a product, there is less waste as a by-product and, therefore, improves an organisation's environmental performance and should be mandatory for businesses that manufacture goods, according to Mallick et al. (2023) and Ni et al. (2023). Sathish and Jayaprakash (2017) have a different view on the concept and suggest that reverse logistics is seen as controlling returns both internally and externally to the organisation. Internally refers to returns from the manufacturing and distribution processes, while external refers to the end-user or consumer (Sathish and Jayaprakash, 2017). Table 3.20 highlights the returns that businesses can be impacted by from an internal and external perspective.

Table 3.20: Internal and external returns

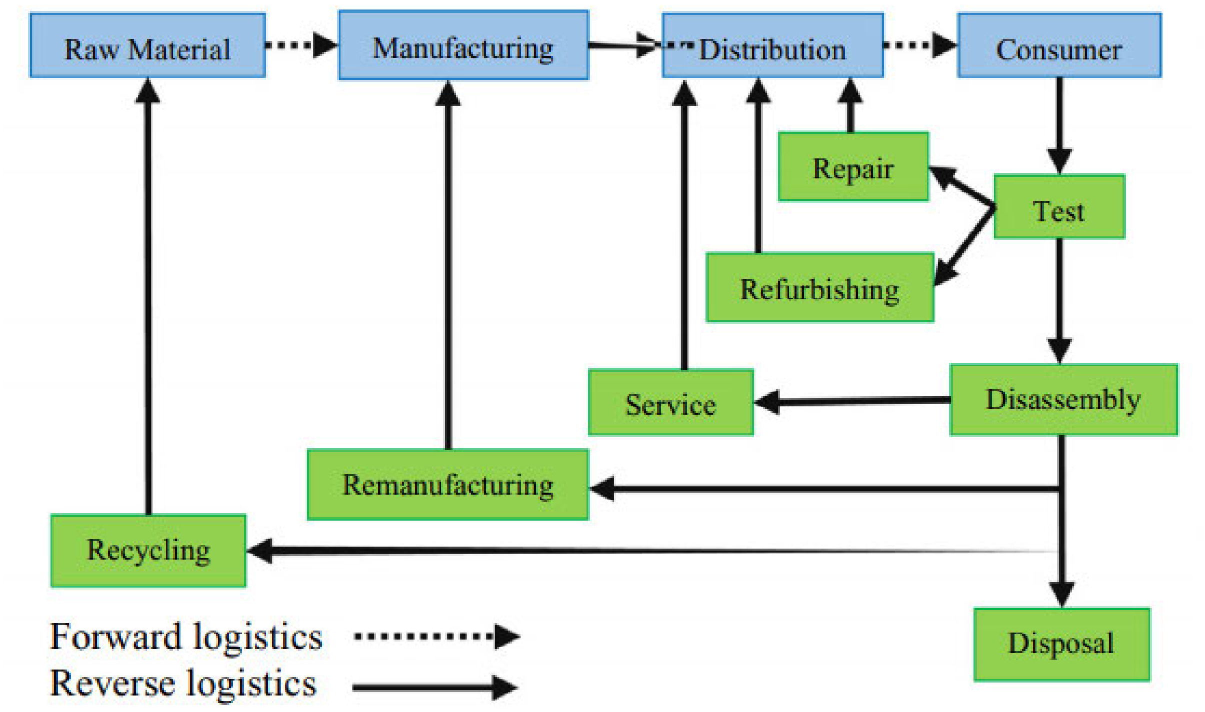
Internal returns (manufacturing and distribution)	**External returns (end-user)**
Quality control returns	End of use/ end of the product life cycle
Raw materials surplus	Service returns (spare parts and returns)
Production leftovers	Reimbursement guarantees
Functional returns	Warranty returns
Commercial returns	
Product recalls	
Stock adjustments	

Source: Adapted from Sathish and Jayaprakash (2017: 551-556)

According to Cahyono et al. (2023), internal returns generally occur within the manufacturing organisation or between the manufacturer and the distributor. These returns can be related to quality issues, production miscalculations, obsolete stock and incorrect order fulfilment (Cahyono et al., 2023). According to Sujová and Simanová (2021), quality control returns are finished products or work-in-progress materials that have been identified as defective or non-compliant with quality standards. These products have not left the manufacturing plant and have been identified by the manufacturing team or through quality audits and must be reassessed to determine if the batch must be discarded or reused (Sujová and Simanová, 2021). Raw materials surplus occurs when the warehouse sends more raw materials than is required in a given manufacturing run, these excess materials must be sent back to the warehouse to be stored and used when required (Sathish and Jayaprakash, 2017). According to Akter et al. (2022), production leftovers are the excess materials that have not been used during a production run, these materials must be audited to determine if the materials can be returned to the warehouse or discarded. The leftovers can be in the form of packaging materials, raw materials and operational materials that are used in the production process (Akter et al., 2022). Functional returns are made due to products not being able to operate for their intended purpose and need to be discarded or reworked (Sathish and Jayaprakash, 2017). Lin et al. (2023) state that commercial returns are instances of returns that occur due to the incorrect product being shipped or ordered as well as damages to the product during transportation. The manufacturer is held liable for the costs associated with commercial returns even though it not have been an issue that occurred in the manufacturing plant (Lin et al., 2023). According to Gelbrich et al. (2023), product recalls occur when a product has been deemed defective or obsolete and has already been shipped to distributors, the manufacturing company will then request that all products be shipped back to the manufacturing plant for reuse, recycling or disposal. Product recalls are generally initiated only if the defect or issue is severe as this process is costly and negatively impacts the organisation's reputation (Gelbrich et al., 2023). The accuracy of stock levels is of crucial importance to an organisation as it directly impacts production planning and order fulfilment, therefore, the instance of stock adjustments is unfavourable and impacts an organisation's efficiency (Ramamohan, 2023). Usman et al. (2023) identify that stock adjustments are recalculations that are made to the inventory of stock due to lost or damaged stock, theft, incorrect initial counts of stock and obsolete stock. Adjustments made to stock can be either increases or decreases based on the nature of the recalculation (Usman et al., 2023).

According to Sathish and Jayaprakash (2017), external returns are returns that come directly from the end-user, which can be in the form of warranty-related returns, service returns and end-of-product life cycle returns. According to Dai et al. (2023), warranty-related returns occur when a product fails to perform its intended purpose or breaks within its warranty period. The product is then returned to the manufacturer to be repaired and shipped back to the customer (Dai et al., 2023). In an instance of a reimbursement guarantee, the manufacturer has agreed to accept the product back from the customer with a full payment of the cost price paid by the customer for the product (Sathish and Jayaprakash, 2017). Service returns are when a product is returned to the manufacturer to be serviced to ensure that it will continue to function for the foreseeable future and to repair defects (Zhang et al., 2023). According to Martins and Marto (2023), at the end of a product's life cycle, customers can send a product back to the manufacturer for proper disposal or recycling. This is especially important in industries that operate with harmful or hazardous products, as they can impact the environment negatively if disposed of incorrectly (Martins and Marto, 2023). Some products can be recycled and reused in the manufacturing process, which drastically reduces the impact of the product on the environment and improves the cost savings of an organisation (Martins and Marto, 2023).

According to Hyder et al. (2023), reverse logistics plays a critical role in the improvement of organisational and environmental performance. Paras and Pal (2020) suggest that reverse logistics improve organisational performance through the resale of second-hand products and the recycling of materials to be reused through re-manufacturing. The impact on environmental performance is evident through the reduction of waste and proper disposal of materials to reduce pollution (Paras and Pal, 2020). Figure 3.11 is a process depiction of reverse logistics and forward logistics to distinguish the difference between both concepts.



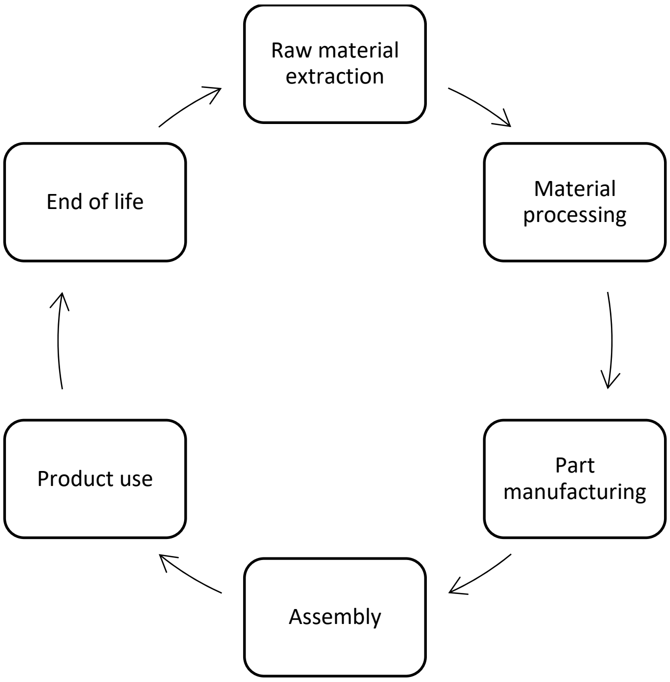
Source: Zarbakhshnia et al. (2020: 2)

Figure 3.10: Process view of forwarding and reverse logistics

As can be identified in Figure 3.11, reverse logistics is more complex than conventional forward logistics. Where forward logistics would simply move the product towards the end consumer, reverse logistics goes backwards to the supplier by going through a host of different processes to determine which product or material should be reused, re-manufactured, recycled or repaired. Once the product has reached the consumer and is found to not be fit for use, it is either repaired, refurbished, recycled, disassembled and used for remanufacturing or disposed of (Parchomenko et al., 2023). The repair and refurbishing process moves the product either back to the customer or the distributor for resale (Parchomenko et al., 2023). If the product cannot be repaired or refurbished, then it is sent back to the manufacturer for remanufacturing or recycling (Parchomenko et al., 2023). In the stage of remanufacturing the product is disassembled to identify faulty components or to salvage useable materials to be reused in the manufacturing process (Zarbakhshnia et al., 2020). In the product recycling process, the product is disassembled and sent off to be broken down to be used as raw materials (Zarbakhshnia et al., 2020). If there is no possible way to salvage the product, it then gets disposed of and does not move into the reverse logistics process. According to Milios and Dalhammar (2023), in some instances, consumers simply dispose of a product if it is damaged or if its life cycle has ended, which is the easiest option but has the most significant environmental impact. Zarbakhshnia et al. (2020) state that the further back a product moves in the reverse logistics process, the higher the transportation costs.

3.10.2 Green design

According to Öztürk and Asghar (2023), green design is a method used by organisations to develop products that have a reduced environmental impact, which is sometimes referred to as eco-design. A simple way of looking at this concept is that of regular light bulbs versus energy-saving light bulbs. The purpose of green design is not only to improve the environmental performance of an organisation but also to meet governmental regulations and to gain consumers' interest (Hong et al., 2019). Khan et al. (2023) suggest that green design has become a key competitive advantage as consumer environmental awareness continues to grow. Saxena et al. (2023) argue that green design is difficult to implement as it should begin on a supplier level. The components of a product contribute substantially to the overall design of a product, and if correct environmental procedures are not followed by suppliers, it will compromise a product's ability to facilitate green design, according to Bag et al. (2018). Figure 3.12 identifies the process for green design and also highlights that green design considers several operations.



Source: Adapted from Hao et al. (2020: 2)

Figure 3.11: Green design process

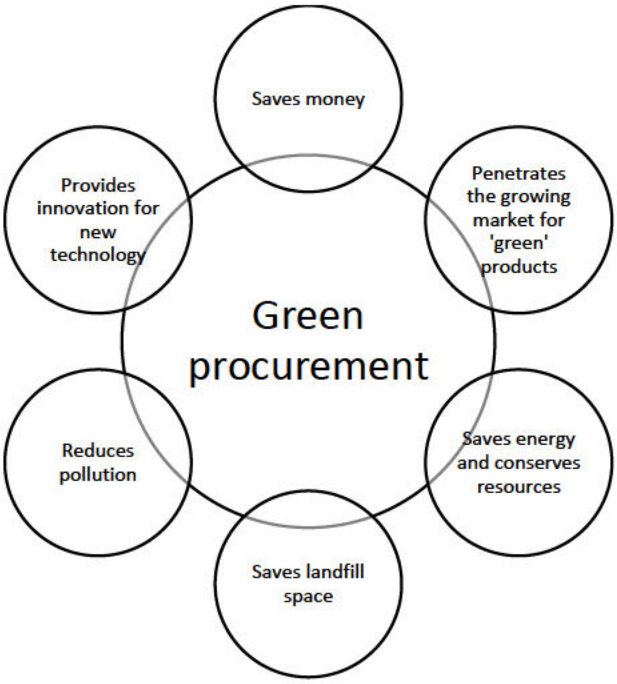
The use of green material facilitates the circular product life cycle that is depicted in Figure 3.12. Bio-degradable material is broken down by the environment, and those that are recyclable are then reused as materials in the production process (Elsayad et al., 2023). Kim et al. (2023) suggest that two types of green material can be used in a product, namely, biodegradable polymeric materials and biomass-based carbon materials. Biodegradable polymeric materials are resources that can be broken down through the actions of naturally occurring organisms (Gao et al., 2018; Gotro, 2012). These organisms include but are not limited to bacteria, algae and fungi. According to Gao et al. (2018), biodegradable polymers can be divided into two types, which are:

- Synthetic polymers are manmade biodegradable materials.
- Naturally derived polymers are biodegradable materials that are formed during the life cycles of green plants, animals, bacteria, and fungi.

These materials have been used in the healthcare sector to great success. The use of these materials in electronics has also seen a shift in the sustainability paradigm for a number of companies, according to Mukherjee et al. (2023). According to Naqvi et al. (2023), biomass-based carbon materials are renewable sources of biomass that are eco-friendly. Biomass is a renewable organic material that comes from plants and animals and is used for a host of human activities, such as transportation and the generation of electricity, according to Gao et al. (2018). Liu and Chen (2023) state that green design is seen as a critical technique offered to companies to improve their environmental performance as it facilitates the creation of biodegradable products. According to Lutfi et al. (2023), green packaging also forms a critical element of green product design, as packaging materials directly impact the environment if they are not disposed of correctly. Bose et al. (2023) also highlight that green packaging is a key element of green design as packaging is often the most commonly disposed of element of a product and is a contributor to both water and land pollution. Khan et al. (2023) state that the adoption of green materials is important within the pharmaceutical industry as it is the most common waste by-product. A significant amount of packaging is used within the pharmaceutical industry to ensure that the efficacy of a pharmaceutical product is maintained this results in large amounts of waste packaging material (Khan et al., 2023). The use of green design also has financial benefits in the creation of reusable and recyclable products (Hu, 2020).

3.10.3 Green purchasing

According to Elbarky et al. (2023), green purchasing refers to the procurement of products that are environmentally sustainable. This is indicative of products that can be recycled or that are biodegradable and avoid those that are harmful to the environment (Jaiswal and Kant, 2018). Bohari et al. (2017) support this definition by stating that green procurement is focused on minimising the negative environmental impact of an organisation through the discipline of purchasing. According to Galeazzo et al. (2021), green procurement refers to the development of environmentally-friendly products and services through collaboration with suppliers. According to Khan et al. (2023), the benefits of green procurement are not solely focused on sustainability but also on reducing the cost structure of an organisation. Ivanova (2020) agrees with Khan et al. (2023) by stating that the purpose of green procurement is for both ethical and commercial purposes. Ivanova (2020) expands on the concept of green procurement by emphasising that it should also encapsulate the social and economic pillars of sustainability. Ivanova (2020) argues that green procurement must focus on the development of local suppliers and small-medium businesses as that will contribute to developing the other pillars of sustainability. Bryngemark et al. (2023) concur with Ivanova (2020) by stating that the local sourcing of goods is an important element of green procurement as it shortens the travel distance of goods and services and, therefore, reduces carbon emissions. Khan et al. (2023) expand on the purpose of green procurement by stating that the premise of this green initiative is based on the belief that an organisation benefits from improved environmental, social and economic performance. Shahzad et al. (2023) suggest that the development of green procurement in organisations comes as a result of driving forces such as legislation and a greater need for sustainable products by consumers. Figure 3.13 identifies the benefits of green procurement to the organisation. The six benefits highlighted in Figure 3.13 are focused on an organisation's profit margin, environmental impact and competitiveness in the market. Savings made through lower transportation costs, raw material prices and a reduction in energy usage reduce manufacturing overheads and improve the profitability of an organisation (Ayimba, 2020). The reduction in pollution and use of landfill space reduces an organisation's carbon footprint and improves overall environmental performance (Ayimba, 2020). The adoption of new technology and market penetration improves the competitiveness of an organisation as a whole (Ayimba, 2020).



Source: Adapted from Ayimba (2020: 1-8)

Figure 3.12: Benefits of green procurement

The need for green procurement is evident as the other green initiatives involve the use of green procurement (Khan et al., 2023). Green design and green logistics are dependent on procurements' ability to build environmentally sustainable products and source locally to reduce carbon emissions (Jaiswal and Kant, 2018). The focus of organisations on green procurement can ultimately help develop the sustainable structure of an organisation by building environmentally-friendly practices into operations (Jaiswal and Kant, 2018).

3.10.4 Use of green technologies

According to Jiakui et al. (2023), green technologies can be defined as technology that has a positive impact on the environment and society. Green technologies are key to controlling pollutant emissions effectively and economically (Yin et al., 2023). According to Fujii and Managi (2019), green technology is a tool that can be used to integrate economic development with conservation initiatives. According to Barbieri et al. (2020), green technologies are the drivers of sustainable practices and initiatives. The development of technologies that are more efficient than their predecessors reduces the number of inputs, such as fossil fuels, that cause environmental degradation (Barbieri et al., 2020). Ghisetti and Quatraro (2017) suggest that green technologies are created through green innovation, which is driven by environmental regulations and growing consumer concern for sustainability. Some of the commonly used green technologies that are used in industry are depicted in Table 3.21.

Table 3.21: Types of green technology

Technology	**Description**
Self-sufficient buildings	Self-sufficient buildings are those constructions that can function by themselves by generating energy without the need for an external contribution. One way to achieve greater productivity with the same surface of photovoltaic panels is to incorporate intelligent solar tracking systems, thus obtaining an optimal use of radiation.
Recycling and waste management	The increase in household and industrial waste has been disproportionate. Managing solid waste is the commitment of companies as well as individuals. Outstanding technologies such as smart containers, automated food waste tracking systems and automated optical scanning technologies can help sort mixed plastics by separating them from others.
Elimination of industrial emissions	The management of air pollutants in industries can significantly reduce the greenhouse effect. Methane and carbon dioxide are substances that harm the environment. Industries such as chemical, petrochemical, pharmaceutical, automotive, etc. must eliminate their emissions so as not to cause serious environmental damage.
Wastewater treatment	Key developments include membrane filtration, microbial fuel cells, nanotechnology, the development of biological treatments and natural treatment systems such as wetlands. All these processes are used to make water drinkable or significantly reduce the presence of pollutants from what is discharged into the sea and rivers.
Waste-to-energy	This technology focuses on generating energy from garbage. Several organisations develop waste treatment solutions that generate energy in the form of steam, hot water or electricity that each company can later use for internal processes.
Generation of energy from the waves	This natural form of energy generation focuses on the movement of the ocean in the form of waves to generate energy. Those components of the technology are semi-submerged in the sea and are responsible for transforming the movement of the waves into electrical energy.
Vehicles that do not emit gases	These are known as ecological vehicles that do not negatively influence the environment and contribute to reducing the presence of polluting gases in the atmosphere, mainly carbon dioxide, carbon monoxide, nitrogen oxide, unburned hydrocarbons and compounds of lead and sulphur dioxide.
Harnessing solar energy	One of the more successful systems used by companies as they are fairly easy to set up and apply to most companies. Examples of solar energy conversion technologies are high vacuum tubes for hot water, polypropylene collectors for hot water, photovoltaic collectors to produce electricity and solar street lamps, among others. All those technologies aim to reduce dependence on energy from hydrocarbons and fossil fuels and promote greener solutions.
Vertical gardens and farms	The installation of vertical gardens in buildings also helps save energy and brings many benefits to the environment. Vertical gardens do not need watering routines that involve unnecessary use of water, and because they are installed along a wall, they reduce the intense hearing pollution that comes from the outside. Moreover, it helps isolate the high temperatures that are presented by climate change, resulting in significant savings in energy, heating and air conditioning. If we extrapolate this technology to farms, we can save a lot of water and take care of the fertile soil.

Natural gas boilers	Green boilers are boilers that consume as little fuel as possible or use renewable energy. Natural gas, although it is also a fossil fuel, the particularity that it emits almost no toxic gases such as nitrogen oxides, particles, carbon monoxides or sulphur. It releases more water vapour and less carbon dioxide. It is the most environmentally-friendly fossil fuel in terms of emissions, with 204 grams of carbon dioxide per thermal kilowatt-hour. Therefore, natural gas boilers tend to be condensed, which means that they recover the heat from the water vapour coming out of the chimney, achieving higher thermal yields with less air pollution.

Source: Tecam (2019: 2-11)

Du et al. (2019) argue that the use of green technology can improve an organisation's environmental performance but is not a financially viable option for many organisations. This is a result of a lack of access to green technology providers or low-cost alternatives (Du et al., 2019).

3.10.5 Recycling and reuse

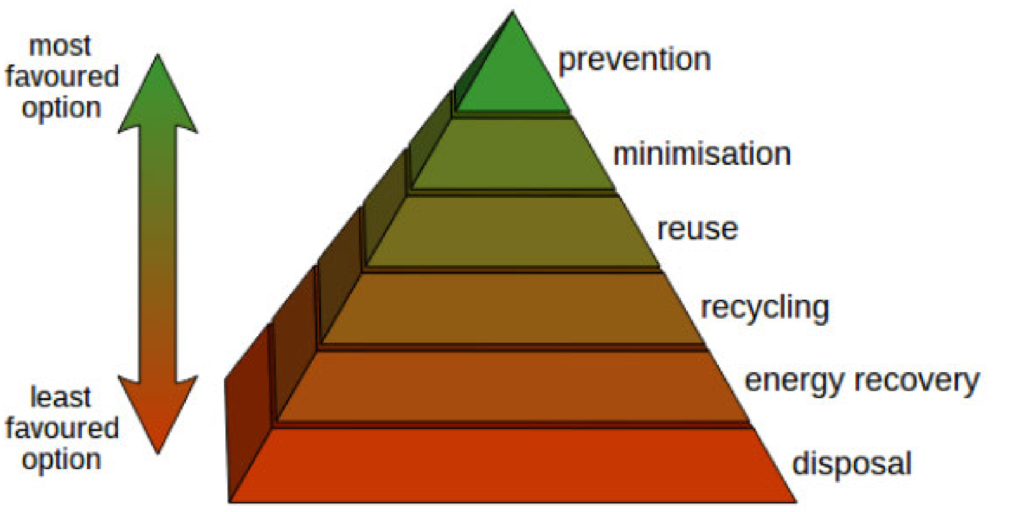
According to Suhandi and Chen (2023), recycling and reuse are essential sustainable practices within the pharmaceutical industry. Recycling and reuse help close the loop to supply chain processes and drive improved environmental performance within the pharmaceutical industry (Suhandi and Chen, 2023). Sadiq et al. (2023) state that the rapid development during the industrial revolution was based upon high resource consumption that resulted in the depletion of non-renewable resources. Gyamfi et al. (2022) suggest that industrialisation has had serious environmental impacts that have led to the destruction of ecosystems and high levels of pollution. This is evident in countries such as China, which have high levels of pollution and habitat destruction, according to Pan et al. (2019). According to Matthews et al. (2021), recycling laid the foundation for a circular economy as it focuses on the reuse of resources or breaking them down into less harmful substances. Another benefit of a circular economy was the reduction in the use of virgin materials. However, there is a distinct difference between reusing and recycling. Table 3.22 identifies the differences between reducing and reusing.

Table 3.22: Difference between reusing and reducing

Reusing	**Recycling**
Reusing refers to using an object as it is without treatment. This reduces pollution and waste, thus making it a more sustainable process.	Recycling means turning an item into raw materials which can be used again, usually for a completely new product. This is an energy-consuming procedure.
The reusing process is not about repurposing the materials an object is made of but repurposing the very object itself.	Recycling reduces waste disposal by transforming useful materials such as plastic, glass and paper into new products.
Reusing is better than recycling because it saves the energy that comes with having to dismantle and re-manufacture products.	A large amount of energy is needed to transport, process and reassemble recyclable materials.
It also significantly reduces waste and pollution because it reduces the need for raw materials, saving both forests and water supplies.	The recycling process can be complex based on the type of product that is being recycled.

Source: Adapted from Hirsch (2021: 4-11)

As identified in Table 3.22, reusing is a preferable option as opposed to recycling. However, the option to recycle has become an attractive feature as not all products can be reused, but many products can be recycled based on their composition. Technological developments have made it possible to recycle materials such as aluminium, cardboard, glass and lead. Figure 3.14 identifies the preference for recycling and reuse at the end of the product life cycle.



Source: Hirsch (2021: 2)

Figure 3.13: End of product life cycle matrix

Prevention and minimisation refer to reducing the number of products that are used by an individual or abstaining from using a product if its use is not necessary (Barrett et al., 2020). According to Matthews et al. (2021), reuse and recycling refer to using a product after its intended purpose is fulfilled or at least breaking it down to reuse material components for other purposes. Energy recovery refers to the conversion of waste to energy (Hao et al., 2019). There are two types of technologies used generally for converting waste streams into energy, namely, thermal and biological (Ramos et al., 2022). According to Hoang et al. (2022), thermal waste-to-energy is created by burning trash, while biological processes are typically focused on anaerobic digestion. Energy recovery reduces carbon emissions by reducing the need for fossil fuel-based energy sources and reduces methane emissions generated by landfills (Ramos et al., 2022). Finally, disposal is the least favourable situation as the product is transported to a landfill site to be dumped.

3.10.6 Green warehousing

According to Calignano and Mercurio (2023), warehousing is an essential component in a supply chain, and the environmental impact of these centres is becoming visible to society. Therefore, the rise of green warehousing as an initiative to ensure the smooth flow of business is a crucial advancement in sustainable development (Bartolini et al., 2019). According to Morrison (2022: 1-2): “Green warehousing is the idea that fulfilment centres can do more than create environmental pollution. With specific strategies, any warehouse can reduce its carbon footprint”. The initiative of green warehousing has a number of practices that are used to drive this initiative, which is identified in Table 3.23.

Table 3.23: Green warehousing practices

Green warehouse practices	Explanation
Storage optimisation	Store products in a way that minimises the total floor space. Also, consider stacking products on pallets that forklifts can easily handle and move to minimise any expenditures associated with moving these items.
Inventory control	Make sure to properly package, label, and store inventory. This minimises damage, which saves money whilst decreasing how much waste is sent to landfill sites.
Cross-docking	By transferring products directly from the supplier truck to the delivery vehicle bound for the customer fewer resources in the warehouse are used.
Recycling and reusing	Reusing pallets and storage materials when possible saves money and helps the environment. Recycling old materials keeps them out of landfill sites and saves on disposal fees.
Energy-saving practices	Increasing warehouse insulation, using energy-efficient or natural lighting, and automating lighting can reduce energy costs.
Warehouse management	Warehouse management systems automate and streamline many processes within the warehouse, reducing expense and waste. For example, it can record inventory locations, direct employees where to store items and calculate the most efficient sequence for picking items. Warehouse management software also facilitates shipping to customers from the closest warehouse, minimising transportation use.

Source: Agility (2021: 10-14)

Morrison (2022) posits that green warehousing has a host of benefits, such as consumer brand loyalty, increased employee satisfaction and increased savings. Modica et al. (2021) further enforce these sentiments by stating that green warehousing directly impacts an organisation's cost savings and operational success. Therefore, it is evident that green warehousing has a critical role in the GSCM and sustainable development. Mashud et al. (2021) argue that to reap the rewards achieved through greater efficiency and cost savings, an initial investment needs to be made by an organisation to facilitate the adoption of this initiative. This could be in the form of solar panels, recycling bins and other enabling technologies (Mashud et al., 2021). According to Oloruntobi et al. (2023), green warehousing also encompasses sustainable inventory management to ensure that waste is limited and that inventory is optimised to reduce obsolescence. Guo et al. (2023b) highlight that green warehousing is especially important in the pharmaceutical industry as they hold important raw materials and finished goods over a prolonged period and, therefore, generate high energy usage. Martins and Carton (2023) state that the usage of energy in warehouses within the pharmaceutical sector is high due to the use of cooling units and temperature control systems to ensure that pharmaceutical ingredients and products are protected as they are light and temperature-sensitive. This highlights the need for green logistics initiatives within the pharmaceutical industry, according to Guo et al. (2023a).

3.10.7 Green logistics

According to Rosano et al. (2022), the field of logistics was seen by many as an opportunity for the transportation industry to present a more environmentally-friendly face. Ren et al. (2020) state that during the early 1990s, there was an outpouring of studies, reports and opinion pieces suggesting how the environment could be incorporated into the logistics industry. Taddese et al. (2020) state that the development of sustainable logistics practices originated from the growing awareness of environmental problems such as acid rain, chlorofluorocarbons and global warming, which were well-publicised issues at the time. The World Commission on Environment and Development Report (1987) established environmental sustainability as a goal for international action, giving green issues a significant boost in political and economic arenas (Rodrigue et al., 2017). According to Bianchi (2021) and Rakhmangulov et al. (2017), the adoption of the word 'green' within the discipline of transportation began in the 1980s and 1990s. Logistics was seen as a method to develop sustainable operations, as transportation was seen as a major contributor to environmental degradation, according to Du et al. (2023). Over the years, green logistics has shifted its focus from sustainability to the exploitation of new markets (Bianchi, 2021). According to Rodrigue et al. (2017), this gives rise to reverse logistics and the financial benefits associated with good environmental performance. For the purpose of this study, the definition by Alves (2019: 2) is used, which states that "green logistics describes all attempts to measure and minimise the ecological impact of logistics activities. In practice, green logistics should be implemented in such a way that there are benefits for these three stakeholders; economy, environment, and society".

According to Nikseresht et al. (2023), green logistics encompasses business practices within the logistics spectrum that are targeted at making operations more sustainable. According to Shu et al. (2023), this can also be identified as eco-logistics, and it builds upon the foundation laid by traditional logistics. In traditional logistics, the focus is on operations, but there is no consideration for the environment (Shu et al., 2023). According to Nureen et al. (2023), the goal of green logistics is to improve both business operations and the sustainability of the organisation as logistics operations. Another definition by Seroka-Stolka and Ociepa-Kubicka

(2019: 471) identifies: “green logistics as green supply chain management by a company (organisation), which takes into account environmental issues and integrates them with supply chain management to change the environmental performance of suppliers and customers”. Wang et al. (2018: 1) support the previous definitions by stating:

> The main aim of green logistics is to reduce the environmental externalities of logistics operations, such as greenhouse gas emissions, noise, and waste, and obtain balanced development among the economy, society, and the environment. Distinguishing from logistics, the main aim of which is to minimise cost, green logistics activities are motivated by environmental considerations.

Chen et al. (2023) argue that even though advancements in green logistics have been made over the years, significant issues such as pollution, congestion and resource depletion are still prevalent. Hussain et al. (2023) state that green transportation is also an essential element of green logistics as it focuses on the reduction of emissions and environmental impacts caused by the transportation of goods. Zhao et al. (2023) highlight that green transport has a two-fold focus, which is to improve environmental performance and increase environmental efficiency. Ahmad and Satrovic (2023) note that green logistics and green transportation are necessary to drive sustainable development to the growing population and increased need for goods and services. According to Agyabeng-Mensah (2020), the high level of poor environmental performance is a result of the increase in demand for goods and services transportation as a result of growing population needs. Grinin et al. (2023) further emphasise this by stating that the growing level of human consumption has driven the need for the creation of goods and services thus resulting in severe environmental degradation.

3.11 Barriers to green logistics

According to Suraharta et al. (2023), barriers to green logistics are factors that negatively affect the growth and development of sustainable initiatives within the logistics operations of an organisation. According to Panghal et al. (2023) and Xu et al. (2023), these barriers cannot only hinder the progress of sustainability initiatives but can also lead to failure and the wastage of organisational resources. According to Creazza et al. (2023), to improve the success rate of green logistics initiatives, an organisation must determine the barriers that affect these initiatives. By doing so, they will be able to develop solutions to minimise the impact that these barriers have on the initiative (Creazza et al., 2023). Ranieri et al. (2018) posit that they had systematically reviewed the operation research literature on green logistics and found that environmental externalities could be significantly decreased by the optimisation of logistics activities. The factors that influence the implementation of green logistics include government environmental regulations, customers, internal company management, supplier management, social factors and competitiveness (Ranieri et al., 2018). According to Boean (2023), Fatima and Mukhtar (2023) and Roschangar et al. (2015), some of the barriers that face sustainable initiatives in the pharmaceutical industry are financial, regulatory, technical and organisational.

3.11.1 Legislative barriers

According to Zighan et al. (2023), the pharmaceutical industry is a research-intensive industry that is highly regulated by both government and professional bodies. According to Kim et al. (2023), the core purposes of the regulations within this industry are to protect consumers from the harmful effects of the drugs that are manufactured, to promote research and innovation, to control private and public expenditure and to ensure that guidelines are in place to promote best practices. Instances of malpractice within the pharmaceutical industry can be injurious to the health of the general populace as pharmaceutical products are widely used across the world (Kim et al., 2023). Government and professional body legislation also prevents the exploitation of consumers by pharmaceutical companies (Zighan et al., 2023). As discussed previously, the pharmaceutical industry is a multi-billion rand industry and many consumers are reliant on it for quality of life and physical well-being. This makes it possible for pharmaceutical companies to charge absorbently high prices for these life-giving medications (Mattingly et al., 2023). Legislation mitigates both the instances of overpricing and monopoly over the market, according to Bhatt et al. (2023). According to Bhatt et al. (2023), the depth of regulations within the pharmaceutical industry from the stage of a new drugs patent application, marketing approval, manufacturing and supply chain processes, patent expiration and competitive strategies. All key role players in a pharmaceutical supply chain are regulated, including manufacturers, distributors, suppliers of materials (both raw and packaging) and prescribing physicians (Bhatt et al., 2023).

According to Khan and Ali (2022), although legislation is used to protect the general population and provide guidelines for best practices within the pharmaceutical sector it can be a barrier to the adoption of green logistics initiatives. Sodhi et al. (2023) state that policies that govern manufacturers, suppliers and distributors can also limit the flexibility of supply chain operations, which makes pharmaceutical supply chains reliant on legacy processes. Green logistics initiatives that focus on local sourcing of material and shortening the supply chain are unlikely to be adopted as only accredited suppliers can distribute pharmaceutical ingredients, which limits the potential to change to local suppliers (Sodhi and Tang, 2021). Shamsuzzoha et al. (2020) state that policies governing the distribution of pharmaceutical products also limit the ability of distribution companies to move to more environmentally-friendly vehicles and warehouses. Many pharmaceutical products are sensitive to various elements such as light, humidity and temperature (Shamsuzzoha et al., 2020). Therefore, transportation and warehousing of pharmaceutical products are limited to refrigerated and temperature-controlled transport and warehousing methods. According to Pramudana et al. (2023), the standards set by government regulations also limit the choice of distribution channels and partners and relevant certifications are required to be a distributor of pharmaceutical products. The ability of pharmaceutical companies to develop strategic sustainable partnerships is, therefore, reduced as the choice of suppliers and distributors is limited to certified companies, which hinders an organisation's bargaining power to drive sustainable development initiatives with its industry partners (Pramudana et al., 2023). Golrizgashti et al. (2023) state that the greater the choice of suppliers and distributors are, the more bargaining power is available to the manufacturing organisation as it can find alternative options that are favourable towards its environmental strategies. Therefore, the regulations within the pharmaceutical sector inhibit the flexibility of green supply chain initiatives and innovation.

3.11.2 Financial barriers

According to Sharma et al. (2023), a significant barrier to green logistics within the pharmaceutical industry is the initial financial investment that is required. The cost of developing green practices across all Logistics Departments can be significant as it accounts for training staff, testing new processes, purchasing new equipment and potential downtime (Sharma et al., 2023). According to Palit et al. (2022), the first cost that is associated is that of identifying and adopting a green logistics initiative that will be effective and efficient; once this has been identified, the required equipment will need to be purchased and installed. The final stage would be to train staff and implement the green logistics initiative, which can sometimes incur costly downtime and troubleshooting (Palit et al., 2022). If the new logistics process is complex, it may require the hiring of external professionals to guide the process and train staff (Palit et al., 2022). Each of the above processes requires an outlay of capital by the manufacturing organisation. Feng et al. (2022) state that the amount of capital investment by an organisation is unique as it is dependent on the type of green logistics initiative that is being adopted. According to Rahman et al. (2020), the risk associated with the adoption of a new initiative is that the newly adopted initiative could potentially fail when it is implemented due to poor planning. A new initiative can also result in reduced optimisation and productivity as it may not be a good fit for the adopting organisation (Rahman et al., 2020). This can result in additional costs that are associated with re-training or modification to the original green logistics process (Rahman et al., 2020).

Yang et al. (2023) state that investment in equipment that is required to implement green logistics initiatives is substantial even though the long-term financial benefits can be more significant than the initial investment. According to Golinska and Sethanan (2023), some of the most common green logistics initiatives are the use of renewable energy to take warehouse operations off the grid, and investment in smart technologies and equipment that enable sustainable initiatives. According to Khalid et al. (2023), the initial investment costs for the transition to renewable energy, such as solar power, can be substantial as they include the costs of solar panelling, labour, inverters, and mounting equipment costs. The amount of initial investment is also dependent on the energy demands of an organisation and, therefore, is not always feasible for an organisation with high energy requirements (Khalid et al., 2023). Amlan et al. (2023) state that the investment requirements for smart technologies are significant and often deter organisations from sustainable development initiatives. These costs can take the form of optimisation software, sensor technology, augmented reality, robots, and drones Amlan et al., 2023). Mezgebe et al. (2023) argue that the initial investment in these technologies can vary but is generally substantial and requires continuous expenditure on servicing and repair costs. Perotti and Colicchia (2023) state that costs that are associated with enabling equipment relate to recycling bins, more efficient warehouse equipment and infrastructure development costs, which are costly investments as they focus on reconfiguring the warehouse layout and design. These costs can also be difficult to identify as they vary depending on warehouse size and the level of changes that are necessary (Perotti and Colicchia, 2023).

According to Tao et al. (2023), freight and transportation contribute significantly towards an organisation's carbon footprint and environmental impact within the pharmaceutical sector. This can be attributed to the complexity and length of pharmaceutical supply chains, which have been discussed previously. Moreira and Rodrigues (2023) state that one of the most prominent methods to incorporate green logistics techniques is acquiring a more sustainable fleet or outsourcing logistics processes involving transportation to a service provider. According to Breyer et al. (2023), there are no logistics service providers in South Africa that only use electric or hydrogen-based vehicles due to infrastructure limitations and affordability. Therefore, the only option available to a pharmaceutical organisation is to acquire its own fleet of vehicles. Alp et al. (2022) state that the cost of investing in a sustainable fleet of vehicles is considerably more than diesel. Some of the potential options for sustainable vehicles are electric and hydrogen-powered trucks and vans (Alp et al., 2022). In South Africa, road transport remains one of the most effective methods of transportation due to the lack of infrastructure for rail transportation (Lalendle et al., 2021). According to Wong et al. (2021), hydrogen vehicles can cost up to six times as much as diesel vehicles, which, therefore, requires a substantial investment by an organisation. Electric vehicles are more affordable than hydrogen vehicles but almost twice the price of most diesel vehicles, according to Costa et al. (2021). Walwyn (2020) states that the instability of the power grid in South Africa also places a degree of risk in financing a fleet of electric vehicles in South Africa.

3.11.3 Operational barriers

According to Özaşkın and Görener (2023), operational barriers impact green logistics within an organisation, hinder performance and increase the level of risk that an organisation faces within its supply chain. Chourasiya et al. (2023) and Negash et al. (2023) state that the most common operational barriers that impact green logistics are new product design and integration risks, sourcing and supplier risks, scarcity of skilled labour, strategic misalignment and loss of competitive advantage. Krisprimandoyo et al. (2023) argue that operational risks are the most significant when an organisation's primary purpose is to remain profitable for the foreseeable future and the agenda of sustainability can potentially compromise an organisation's profitability. Özaşkın and Görener (2023) state that if green logistics initiatives are not planned and implemented correctly, they can impact profitability as well as the longevity of an organisation. According to Shahzad et al. (2023), the failure of green logistics initiatives by organisations drives industry partners further away from sustainable development as it is seen as a potential risk rather than an opportunity. Mangla et al. (2023) state that it is essential for all operational barriers to be identified prior to the commencement of green logistics initiatives as they impact the success of the sustainable initiative as well as the organisation as a whole.

Fang et al. (2022) state that the development of new products and reengineering of old products to be more environmentally-friendly is a high-risk initiative as it impacts a number of different elements such as the cost of manufacturing a product, efficacy of a product, misalignment of product purpose and changes to the manufacturing process. According to Malek and Desai (2019), when an organisation decides to develop a product that is more sustainable, it has to absorb the cost associated with the change in the manufacturing process, which can be identified as an unnecessary cost and risk. The new production process will also have to be analysed and evaluated to determine any flaws that could impact production (Malek and Desai, 2019). This risk will have to be borne by the organisation as it will have to replace an already working system with a new one to re-engineer or create a new environmentally-friendly product (Malek and Desai, 2019). Wandosell et al. (2021) state that a common method of product development used in green logistics is that of green packaging, which is focused on using more environmentally-friendly packaging. This type of packaging can be packaging that is less harmful to the environment or one that makes the product more space efficient (Wandosell et al., 2021). According to Meherishi et al. (2019), this also comes with the risk of changing operations and the effectiveness of packaging material. Jagoda et al. (2023), state that changing a product's packaging materials can directly hamper its efficacy and fit for purpose. Fang et al. (2022) argue that the decision to create more environmentally-friendly products must be made by strategic management and all key stakeholders as it directly impacts an organisation's strategy.

Altunay et al. (2021) state that misalignment can occur if strategic goals are only aligned to profitability and lack social and environmental focus. Ingstrup et al. (2021) state that an organisation needs to review its strategy and aim as it develops to remain relevant and profitable. A common factor that contributes to the failure of green logistics initiatives is the implementation of these initiatives in an organisation that is not aligned or ready to adopt them (Ingstrup et al., 2021). According to Liu et al. (2023), an organisation will need to set necessary policies and strategies in place prior to the implementation of green logistics initiatives. This stems from management and stakeholder support, which drives change and commitment within the organisation (Liu et al., 2023). Scown et al. (2020) state that a common misalignment by an organisation is that of environmental sustainability and affordability, which occurs when an organisation is focused on lower to middle-income customers and has to implement product price increases to achieve sustainable goals. This misalignment can lead to a loss of competitive advantage and market share (Scown et al., 2020). Yingfei et al. (2022) argue that market share is a critical element of an organisation's economic sustainability as it relates to profitability and overall performance within the industry. Knoppen and Knight (2022) state that an alignment between stakeholders and organisational goals drives profitability and competitiveness within the industry, which directly determines the sustainability of an organisation in the long term.

According to Birasnav et al. (2022), green logistics initiatives influence the entire supply chain and can create sourcing and supplier risks. Acquah et al. (2021) state that to create a product that is environmentally-friendly an organisation will have to source products that meet the required specifications and the standards that are associated with the organisational policy. Prabhu, et al. (2020) argue that finding suitable suppliers is a time-consuming and risky process as an organisation's manufacturing capabilities are dependent on supplier reliability and affordability. One of the core risks associated with sourcing sustainable materials is the shortage of suppliers in some countries (Karmaker et al., 2023). According to Chakraborty et al. (2023), supplier commitment is a key area of concern as suppliers may not have a strategic focus on environmental performance and, therefore, hinder the manufacturing organisation's progression to improved sustainable performance and collaboration within the supply chain. Skalli et al. (2023) state that the movement towards green logistics can also result in an over-reliance on suppliers, which impacts the manufacturing organisation's purchasing power. If suppliers are aware that their product is scarce and critical to the operations of an organisation they can initiate price changes that negatively impact an organisation's profit margins (Skalli et al., 2023). According to Ababneh et al. (2023), for an organisation to operate effectively when making environmentally-friendly changes to its existing or new product line, it must ensure that there are multiple sources of supply to smoothen the supply chain and reduce disruptions.

According to Panwar et al. (2023), the most common contributor to the failure of green logistics initiatives is poor implementation. de Paula et al. (2023) argue that failure in implementation is directly aligned with employee training and capabilities. Nureen et al. (2023) state that employees are the key component of any green logistics initiative as they are involved with the implementation of these initiatives. If employees do not understand the purpose or rationale behind a given task or initiative they are unlikely to commit to its success (Nureen et al., 2023). Bilderback (2023) identifies that often there are discrepancies between the strategic plan and the implementation of sustainable initiatives, and it can be attributed to poor communication or training. According to Srivastava et al. (2023), the field of sustainability is not a common theme within the education sector, which leads to a scarcity of skills related to sustainable initiatives. According to Bilderback (2023), many organisations rely on robust training regimens to improve employee skills and commitment to green logistics initiatives to combat the skills gap within the field of green logistics. Panwar et al. (2023) suggest that the lack of green logistics knowledge and implementation skills also hinders early risk identification and process improvement of green logistics initiatives.

3.12 Conclusion

This Chapter is aimed at highlighting the literature that is relevant to the study. The critical concepts are discussed to develop a holistic understanding of sustainability, supply chain management and the pharmaceutical industry. Supporting information is presented to develop a foundation for the study through the review of pertinent literature and concepts. Linkages between concepts are also defined, and relationships are presented to determine the link between GSCM and the sustainable performance of organisations within the pharmaceutical industry. This Chapter also reviews literature that relates to the impacting factors that contribute towards an organisation's sustainable performance to gain deeper insights into the potential elements that impact the study.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

In this Chapter, the research design, site and sample size are described to give context to the research methods used in the study. The data collection tools and procedures are also discussed to outline the instruments used as well as the actual processes that were followed during the data collection process. The method of data analysis and steps used to uphold the reliability and validity of results are also explained to provide a holistic view of the research constructs used in the study.

4.2 Research approach and design

The researcher chose to conduct an exploratory study. This type of research is used to investigate a problem that is not clearly defined (Button et al., 2023). The foundation of this type of research is to develop a better understanding of a problem, but it will not provide conclusive results. According to Upamali and Rathnayake (2023), exploratory research is a methodology that is used to investigate a phenomenon that was not previously studied in depth. In exploratory research, a researcher develops an understanding of a problem to set the foundation for future research (Button et al., 2023). This method of research is often referred to as interpretive research or grounded theory approach (Van Verseveld, 2021).

George (2021) states that data collection methods can be divided into primary and secondary research methods. According to Kooli (2023), primary research consists of information provided by surveys and interviews, whilst secondary research is collected from pre-existing research such as case studies, literature reviews and blogs or social media. Shahi et al. (2021) concur with George (2021) by stating that the primary methods of data collection in an explorative study are surveys, interviews and observations, which provide the foundation for the study and are focused on providing insight into the research questions posed. Secondary methods of research are online research, literature research and case study research provide further information that can be used to support the information that has been gathered in the primary research. In this study, both surveys and a key informant interview are used to investigate and provide insight into the research questions. The secondary research is gathered through previous literature, which is used to support the information that is gathered in the primary research.

The research approach used in the study is that of a mixed-methods approach. According to Love et al. (2023), a mixed-methods approach is a combination of both qualitative and quantitative research. According to Mohammadi et al. (2021), mixed methods research requires a combination of data collection and data analysis methods. McBeath et al. (2023) concur with Love et al. (2023) by stating that a mixed methods approach is the collection and analysis of both quantitative and qualitative data within a study. Dousin et al. (2021) state that the mixed-methods approach improves data validity and integrity as it gives a more holistic view of research by using a combination of methods as well as various sources of information to assist in reaching a conclusion. McNabb (2020) states that a mixed-methods approach is used when either qualitative or quantitative research would not suffice to achieve the intended objectives of the study. George (2021) suggests that a mixed methods approach is effective in an exploratory study as it provides a more complete perspective of a case or phenomenon and integrates the benefits of both methods. The benefits of a mixed methods approach are that it improves the generalisability, credibility and contextualisation of a study (George, 2021). According to Noble and Heale (2019), a mixed methods approach improves data credibility and validity through the method of methodological triangulation. Bhandari (2022) highlights that methodological triangulation is achieved when a study utilises two different methodologies to gather information on a phenomenon. Methodological triangulation avoids the research bias that is associated with reliance on a single research technique.

Qualitative research is a type of research technique that is focused on collecting and analysing non-numerical data (Brennan et al., 2023). This type of research is used to understand the phenomenon in society and how an individual subjectively perceives reality (Cho et al., 2022). DeFranzo (2021) suggests that this research is used to gain an understanding of opinions, motivations and underlying reasons for a phenomenon. Bhandari (2020) concurs with Cho et al. (2022) by stating that qualitative research involves gathering and analysing non-numerical data to understand complex concepts, experiences and opinions. Non-numerical data can refer to text, photographs, audio recordings and videos (Albahra et al., 2023). Qualitative research can be collected by methods such as in-depth interviews, focused group discussions and observations (DeFranzo, 2021; McLeod, 2019). According to Bhandari (2020), qualitative research is used to understand how individuals experience a specific situation or the world and focus on gathering rich data. According to Allan (2020), qualitative researchers are considered the instruments through which observations and analysis are conducted since data is filtered through their personal lens. Bhandari (2020) states that qualitative research allows the researcher to gain meaningful insights through detailed descriptions of people's experiences and perceptions. Riazi et al. (2023) argue that qualitative research is highly subjective as the researcher is involved in the role of analysing and interpreting data. In this study, a key informant interview was used as the qualitative research tool. The information gathered was transcribed onto a Word document and analysed by the researcher. The key informant interview is used so that the researcher can probe deeper and gain insights into the study.

Quantitative research is a research technique that involves the objective collection and analysis of numerical data to predict or describe variables of interest (Hendren et al., 2023). According to DeFranzo (2021), quantitative research is used to quantify a problem by transforming and analysing data into usable statistics. Stockemer and Bordeleau (2023) state that quantitative research is the systematic investigation of a phenomenon through the use of surveys, polls and questionnaires. The results can be depicted in numerical form and can be analysed through statistical analysis methods or software (Bloomfield and Fisher, 2019). DeFranzo (2021) suggests that quantitative research uses measurable data and is used to identify patterns in research. Mohajan (2020) suggests that quantitative research is objective and investigational as the information gathered and analysed is logical, statistical and unbiased. This method is used to test causal relationships between variables and generalise results to the larger population (McLeod, 2019). Roni et al. (2020) argue that quantitative research can provide insight into trends but lacks the depth to probe deeper into complex phenomena because of its structured approach to research. According to McLeod (2019), a common aim of this research is to establish general laws of behaviour and phenomena across different settings. Sperber et al. (2023) state that commonly used methods to gather quantitative data are surveys, face-to-face interviews and telephonic interviews. In this study, surveys are used to collect quantitative data. In this study, a case study research approach is used. According to Antal (2023), this approach is used to develop a multi-faceted and in-depth understanding of complex real-life issues. Schoch (2020) states that case study research involves a detailed and intensive analysis of a specific situation, organisation or social phenomenon. McCombes (2022) states that case study approaches are often used in social, business and clinical research and can involve qualitative and quantitative research to gather and analyse data. Case studies are used to describe, evaluate and understand various aspects of a research problem (McCombes, 2022). According to Ezzeddine et al. (2023), the benefits of using a case study approach are that it facilitates focused research and enables the use of data collection methods such as interviews, surveys and observations, which allows for greater depth when understanding different elements of a research problem. Quintao et al. (2020) state that the case study approach provides a comprehensive understanding of a phenomenon, which allows for the transferability of results to another situation. Ljunggren (2023) highlights that the case study approach supports exploratory research as it focuses on a specific situation or organisation whilst gathering data that can be used to determine patterns and probe further into the research problem. In this study, the case study approach was chosen to gain an in-depth understanding of a phenomenon that impacts a specific organisation. The case study approach also supports the exploratory nature of the study.

4.3 Research site

In this study, the research site is CIPLA Medpro Manufacturing, which is an organisation that operates within the pharmaceutical industry. The South African pharmaceutical sector is the largest drug market in Africa, with the fifth-highest expenditure on pharmaceuticals per capita (Rayment, 2020). This is a result of the high disease burden in South Africa, which includes HIV and AIDS, tuberculosis and diabetes, to name a few (Rayment, 2020). Many of the treated diseases in South Africa are chronic lifestyle-related diseases and, therefore, require a steady stream of medications and drugs (Rayment, 2020). In South Africa, the pharmaceutical industry is dominated by multinational pharmaceutical organisations. Around 122 pharmaceutical companies are operating in South Africa (Veitch, 2020). The largest consumer of pharmaceutical products in South Africa is the public sector, even though it is important to note that the private sector has access to a greater variety of products (Veitch, 2020).

Vaccines and ARV medication account for more than 50% of total public sector healthcare expenditure (Veitch, 2020). More than 70% of pharmaceutical products used are produced locally, however, various active pharmaceutical ingredients and finished products are imported (Veitch, 2020). The pharmaceutical industry is highly regulated by government legislation and, therefore, under strict control. According to Mohiuddin (2019: 15), “pharmacy is the art and science of preparing and dispensing drugs for preventing, diagnosing or treating diseases or disorders in humans and animals”. Dailey (2018: 1) supports the view of Mohiuddin (2019) by stating that the pharmaceutical industry focuses on “the discovery, development, and manufacture of drugs and medications (pharmaceuticals) by public and private organisations”. A key characteristic of the pharmaceutical sector is its ability to withstand poor economic conditions (Rayment, 2020). This is attributed to pharmaceutical companies’ medications, vaccines and other medical products being deemed as needs in society (Rayment, 2020). The recent COVID-19 outbreak caused a sharp increase in the demand for pharmaceutical products in South Africa even though the economy was in decline (Arndt et al., 2020). Table 4.1 identifies the top 10 pharmaceutical companies in South Africa based on a study conducted by Jobvine (2021).

Table 4.1: Top 10 pharmaceutical companies in South Africa

Company	**Overview**
1. Pfizer South Africa	Pfizer, a multinational company considered to be the biggest pharmaceutical company in the world, was established in 1953. Based in New York, it has 83 000 employees spread out in 120 different countries. The company is spread out in four different business sectors namely pharmaceuticals, Pfizer animal health, nutrition and consumer health.
2. Aspen Pharmacare Holdings Ltd	Aspen is listed on South Africa's Johannesburg Stock Exchange (JSE) and its products reach more than 150 countries across the world. Aspen has a proud heritage dating back more than 160 years. The Group is committed to sustaining life and promoting healthcare through increasing access to its high-quality, effective, affordable medicines and products. The extensive basket of Aspen products provides treatment for a diverse spectrum of acute and chronic conditions experienced throughout all stages of life.
3.Dischem Pharmacy	Dischem started as a small pharmacy in 1978 in Mondeor, Johannesburg. The Professional Management Review rated it as the best and most successful pharmacy chain in South Africa. The pharmacy is privately owned and run by its founding members, Ivan and Lynette Saltzman. The pharmacy offers a large range of facilities catering to various medical needs.
4. Adcock Ingram	Adcock is a proudly South African pharmaceutical manufacturing company that produces, distributes and markets a variety of products in the healthcare industry. In the private sector, Adcock has been dubbed the leading pharmaceutical manufacturing company, coming in second in the public sector.
5. Alphapharm	Based throughout Southern Africa, Alphapharm is a well-established pharmaceutical. Their comprehensive range of products, including their very own Alpha Own Brand products.
6. CIPLA Medpro South Africa Limited	Founded over 18 years ago, CIPLA Medpro South Africa Limited is one of South Africa's leading pharmaceutical companies. Headquartered in Cape Town, CIPLA Medpro South Africa's world-class manufacturing plant is based in Durban, KwaZulu-Natal. With 65 therapeutic categories and 2000 different products in over 170 countries, including the USA, United Kingdom, Australia, and Germany, CIPLA Medpro South Africa is the third-largest pharmaceutical company by value. Through CIPLA Medpro Holdings Limited, CIPLA Medpro South Africa Limited has been connected to Ciplo India for 20 years and since 2013, CIPLA Medpro South Africa Limited has been 100% owned by CIPLA India.
7. Litha Healthcare Group Limited	Litha Healthcare Group Limited operates within the biotech, medical and pharmaceutical industry. Their motto is: "to actively participate in and contribute to the creation of a healthier society, through the provision of integrated healthcare solutions". The company is listed on the JSE and deals with generic, originator and complementary medicines, devices, consumables and equipment and human vaccines.

8. Meyer Zall Laboratories Proprietary Limited	Meyerzall Laboratories Proprietary Limited operates within the pharmaceutical industry of South Africa. The company was established in 1992 and was later identified as a unique therapeutic system that can be used for various applications such as drug delivery. Most of their business activities, such as manufacturing, sales, research and development, marketing and distribution, are outsourced. The core of the company is their involvement in the development and international distribution of its patented products.
9. Novartis South Africa	Novartis is a world leader in the pharmaceutical healthcare industry. They come up with innovative solutions to meet the needs of the people and communities they work within. Novartis started in 1996, when Swiss companies, Giba-Geigy and Sandoz decided to merge. The name was derived from a Latin word meaning 'new skill'. The main headquarters is situated in Basel, Switzerland, with 98000 employees spread out in 140 countries.
10. Sandoz	Sandoz is the generic pharmaceuticals division of Novartis, a worldwide leader in generics. Having a history of more than 120 years, Sandoz has become a trusted leader with a reputation for exceptional quality. They have a strategic and customer-care approach to developing, producing and marketing affordable medicines following the loss of patent protection. This has successfully made them one of the two most respected generics companies in the world. Their medicines are available to 90% of people across the world.

Source: Jobvine (2021: 1-11)

According to Rayment (2020), the South African pharmaceutical trade has always been characterised by higher levels of imports rather than exports. Of the total amount of exports, around 70% are medicament mixtures such as active pharmaceutical ingredients (Rayment, 2020). However, over the years, several changes to the economy and productivity have resulted in a lower supply deficit. Table 4.2 is a forecast by Rayment (2020) based on research that he conducted on the growth of the pharmaceutical sector.

Table 4.2: Pharmaceutical industry growth forecast in South Africa

Indicator	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Pharmaceutical sales in billions (Dollars)	2.846	3.255	3.898	4.527	4.530	4.146	3.917
Pharmaceutical sales percentage of GDP	0.96	0.93	0.91	0.89	0.87	0.86	0.85
Pharmaceutical sales percentage of healthcare expenditure	10.8	10.5	10.2	10.0	9.8	9.7	9.6

Source: Rayment (2020: 7)

South Africa remains a key pharmaceutical provider in Africa as they are one of the few countries that meet the Goods Manufacturing Practice Standards of the World Health Organisation. To understand the pharmaceutical industry, commonly used terms within the sector are identified in Table 4.3.

Table 4.3: Commonly used terms in the pharmaceutical sector

Term	**Explanation**
Biologics	Bacterial and viral vaccines, antigens, antitoxins and analogous products, serums, plasmas and other blood derivatives for therapeutically protecting or treating humans and animals.
Bulks	Active drug substances are used to manufacture dosage-form products and process medicated animal feeds or compound prescription medications.
Diagnostic agents	Inorganic chemicals for examining the gastrointestinal tract, organic chemicals for visualising the circulatory system and liver and radioactive compounds for measuring the function of the organ system.
Drugs	Substances with active pharmacological properties in humans and animals. Drugs are compounded with other materials, such as pharmaceutical necessities, to produce a medicinal product.
Ethical pharmaceuticals	Biological and chemical agents for preventing, diagnosing or treating disease and disorders in humans or animals. These products are dispensed by prescription or approval of a medical, pharmacy or veterinary professional.
Excipients	Inert ingredients are combined with drug substances to create a dosage-form product. Excipients may affect the rate of absorption, dissolution, metabolism and distribution in humans or animals.
Over-the-counter pharmaceuticals	Drug products sold in a retail store or pharmacy do not require a prescription or the approval of a medical, pharmacy or veterinary professional.

Source: Wouters et al. (2019: 362-363)

The research site for the study is CIPLA Medpro Manufacturing, based at 1474 South Coast Road, Mobeni, Durban, South Africa. CIPLA is a manufacturer of medication that is focused on making high-quality and affordable medication. The CIPLA Medpro Manufacturing branch in Mobeni is involved with the manufacturing and logistics of medications in South Africa. The organisation is currently involved with the development of new sites over the next few years throughout South Africa. CIPLA Medpro Manufacturing in Mobeni was chosen as the study site as it focuses on the logistics of the pharmaceutical organisation in South Africa. The research was conducted on the logistics staff members at the Mobeni branch and included all the members of the department. CIPLA Medpro Manufacturing’s organisational goal, according to their official website, is (CIPLA, 2022: 3): “Our goal is to produce pharmaceutical products of the highest quality that have zero environmental impact, adhere strictly to good manufacturing practices and good laboratory practices, and numerous other international regulatory standards".

It is evident from the above goal analysis that CIPLA Medpro Manufacturing is a relevant study site to conduct the study at. The organisational goals are focused on achieving multiple pillars of sustainability, which then develops a conducive environment for the development of sustainable initiatives such as green logistics. CIPLA South Africa is involved with a host of initiatives such as 'Miles for smiles', 'Ajuga' and 'Sha'p left' that are focused on developing the social pillar of sustainability. From an environmental perspective, CIPLA communicates that it is focused on sustainable value creation through the management of carbon emissions, energy efficiency and the management of waste and water. The sustainability goals identified by CIPLA Medpro Manufacturing are highlighted in Table 4.4.

Table 4.4: Sustainability goals for CIPLA Medpro Manufacturing

By 2025	**By 2030**
Carbon neutral through the use of solar lighting, use of fluorescent lighting and ISO 14001 certification.	Carbon and water positive
Water neutral through the implementation of rainwater harvesting and effluent treatment plant expansions	Antimicrobial compliant
Green chemistry	
Zero waste to landfill sites	
Antimicrobial resistance stewardship	

Source: CIPLA (2022: 4-7)

The goals mentioned in Table 4.4 are being achieved by a number of sustainable initiatives that have been piloted by CIPLA's manufacturing plant in Uganda. According to CIPLA (2022), these sustainable initiatives are rainwater harvesting, solar lighting and the installation of fluorescent lighting, the establishment of an effluent treatment plant, ISO 14001:2015 environmental health and safety certification, replacement of diesel forklifts with the battery operated version, revised waste management procedures, training for departments on good environmental practices, installation of recycle bins, and removal of the sludging processes for incineration, which drastically reduces waste sent to landfill sites. Some of these initiatives are still in their infancy at CIPLA Medpro Manufacturing, with the ambition to realise the complete benefit of these initiatives by the timelines provided in Table 4.4. Their current fully active sustainable projects are the inhaler recycling project, repurposing of marketing items, paper usage reduction, and reverse vending machine transactions (CIPLA, 2022). Given the initiatives mentioned above, the research has identified CIPLA Medpro Manufacturing as a suitable research site to conduct the study.

4.4 Study population and sample size

The population size of the CIPLA Medpro Manufacturing Mobeni branch is 178 employees, split between the various functional departments in the organisation. In this study, purposive sampling is used to determine the sample size. According to Campbell et al. (2020), purposive sampling is a method of sampling that allows the researcher to purposely select the individuals within a population. This method is used to increase the depth of understanding of a specific phenomenon, as it omits members of the population who may not have knowledge or insight into the research problem (Campbell et al., 2020). According to Chai et al. (2021), purposive sampling is used to select respondents who are likely to yield useful information based on the research problem. This study is focused on the barriers that impact a specific department within CIPLA Medpro Manufacturing, which is the Logistics Department. The sample size in this study is limited to the Logistics Department to study the phenomenon in-depth and improve the relevance of the data gathered. The sample consists of 30 employees who make up the logistics team at CIPLA Medpro Manufacturing Mobeni. The study required respondents to have a strong knowledge of the discipline and operations of the Logistics Department. The triangulation of a specific department ensures the integrity of the data collected and that the findings are an accurate depiction of the Logistics Department at CIPLA Medpro Manufacturing Mobeni. Therefore, the sample size included all 30 members of the logistics department. This was done to ensure that the sample size included all relevant individuals to gain a holistic view of the perceptions and responses of the Logistics Department at CIPLA Medpro Manufacturing.

4.4.1 The sampling criteria

The individuals chosen to participate in the study are subject matter experts as they were employed in the organisation when the study was conducted and in the relevant department. Only individuals with the required knowledge have been selected to participate in the study, and this has been identified as the Logistics Department. A census sample is chosen to ensure that the study is an accurate depiction of the Department's sentiments on green logistics. The survey and the key informant interview were both conducted in the Logistics Department to ensure the validity of the results. Figure 4.1 depicts the various departments that were indicated by the Logistics Department manager at CIPLA Medpro Manufacturing.

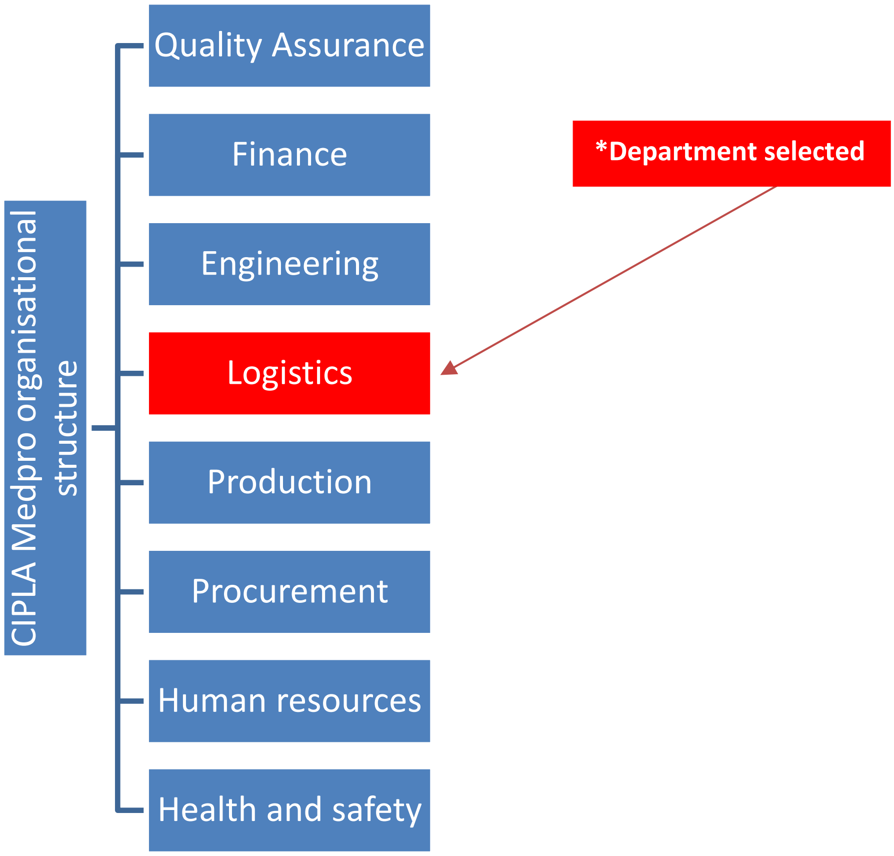


Figure 4.1: Organisational structure of CIPLA Medpro Manufacturing

4.5 Data collection

4.5.1 Data collection instruments

The data collection instruments chosen were a key informant interview (qualitative data) and surveys (quantitative data). The survey method chosen was a combination of face-to-face and online surveys. A combination of survey techniques is used to improve the response rate of respondents due to the limitations of the COVID-19 pandemic, which limited access to respondents. The second instrument used in the research was a key informant interview, which was conducted via a phone call to the respondent once the indemnity form was completed and submitted to the researcher. The data collection instruments were carefully selected based on the research methodology used within the study. Figure 4.2 depicts the data collection tool used and the type of data each tool is aimed at collecting.

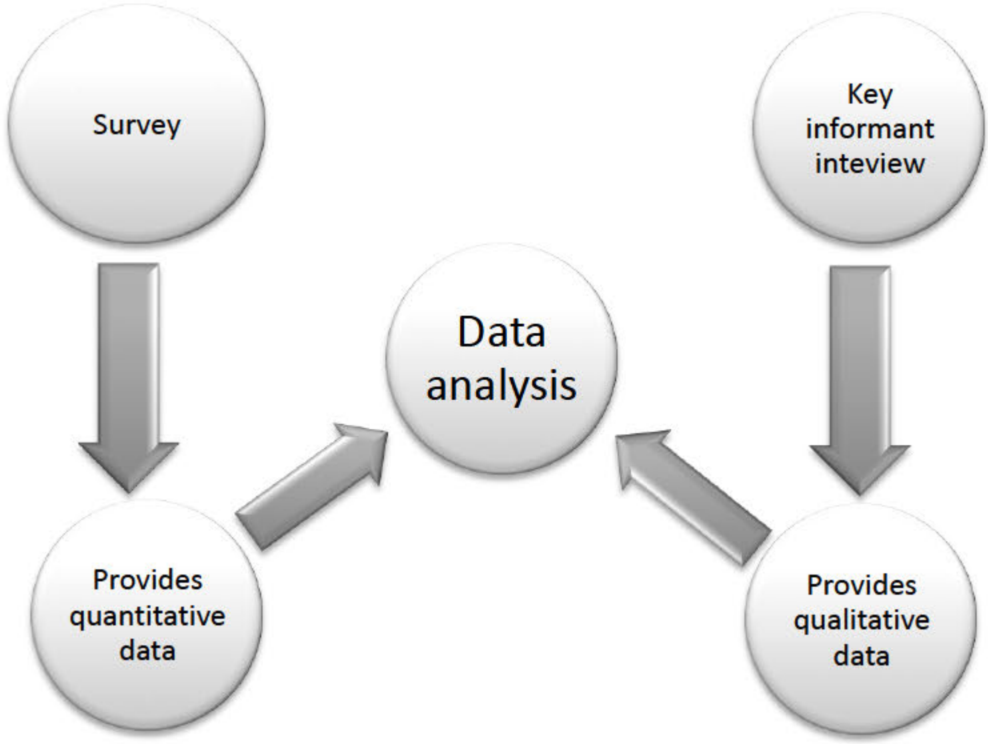


Figure 4.2: Data collection tools

Table 4.5 highlights the various data collection tools that were used in the study as well as the reasoning behind the use of each tool and its overall objective.

Table 4.5: Data collection tools used in the study

Objectives	**Aspects/ Information required**	**Source of information**
To determine the current logistics processes in CIPLA – Value Chain Analysis	• Mapping of the value chain for logistics processes. This is done to identify the current green practices that CIPLA is involved with.	Key informant interview
To establish the level of awareness and attitudes towards sustainability practices and green logistics	• Awareness: knowledgeable of acceptable sustainable practices and green logistics processes, policies, etc. • If participating in training (if yes, type and assessment of usefulness) • Attitudes: which practices do they support and why?	Surveys and key informant interview
To determine opportunities for embracing green logistics in the pharmaceutical industry	• Opportunities: willingness to adopt GSCM initiatives at CIPLA • Does CIPLA support green initiatives? • Is CIPLA well-positioned to initiate green practices? • Does the industry support green logistics?	Surveys
Identify the barriers affecting green logistics in the pharmaceutical industry	• Barriers affecting green logistics initiatives at CIPLA (Internal and external)	Surveys and key informant interview

The guidelines followed on each survey instrument for sampling purposes are presented in Table 4.6.

Table 4.6: The survey sampling process

Sample population	Logistics staff at the warehouse in CIPLA Medpro Manufacturing. This consisted of all operations staff members that were involved in the logistics processes. Total population: 30
Sample size	Consisted of all the operations staff at CIPLA Medpro Manufacturing (therefore, a census sampling approach was adopted). Total sample size: 30
Recruitment	The researcher requested that all CIPLA Medpro Manufacturing operations staff participate in the study. This was done by requesting that the public relations department contact the respondents and get their approval. The feedback on the total number of respondents who had agreed to the study was provided by the Public Relations Department. The surveys were administered to the members by the researcher to ensure that they were properly facilitated and to improve response rates. The gatekeeper's permission letter is attached as Appendix 4.

4.5.1.1 Survey

The method of quantitative data collection that was used in the research was that of a survey. According to Ponto (2015), survey research is a collection of information from a sample of individuals through their responses to predetermined questions. Story and Tait (2019) further explain this data collection instrument by stating that it is the foundation of social science research and is successfully integrated into any discipline. Zhang (2022) identifies that surveys are conducted in various methods; however, the features remain the same as the goal is to gather data. The survey questions were developed in relation to the research problem with the aim of gathering data and probing into potentially related issues that pertain to the study. According to Zhang (2022), a survey is a method of gathering data using relevant questions which are posed to respondents. Commonly used types of surveys are face-to-face surveys, telephone surveys, self-administered paper and pencil surveys and self-administered computer surveys. Bairagi and Munot (2019) state that face-to-face surveys have a higher response rate as opposed to online surveys, this provides valuable insights about the study whilst highlighting the importance of participation to potential respondents. Braun et al. (2021) argue that online surveys are a more effective option when conducting research that requires participation from different geographic locations or respondents that are not accessible. A combination of face-to-face and online surveys was used due to the restrictions of COVID-19. This was to improve the response rate of respondents and ensure that the researcher adhered to COVID-19 regulations. The survey questions were developed using the research questions and objectives of the study. Once the survey questions were established, it was sent for pre-testing to the

Logistics Department Manager and the Human Resource Manager at CIPLA Medpro Manufacturing. The Department Manager was chosen to pre-test the instrument as they are experts in the field and understand the limitations of the team as well as the relevance of the questions. The Human Resource Manager at CIPLA Medpro Manufacturing reviewed the survey to determine if the questions were relevant to the topic and did not deviate.

4.5.1.2 Key informant interview

The data collection tool that was used in the study to gather qualitative data is a key informant interview. According to Innes et al. (2017), key informant interviews are in-depth qualitative interviews with preselected individuals. Docrat et al. (2019) state that key informant interviews are in-depth interviews that are used to gather information and are generally used in explorative research as they facilitate probing questions that can be expanded on further during the interview session. The researcher can choose individuals who possess the required knowledge to ensure that the data is valid and relevant (Innes et al., 2017). According to Docrat et al. (2019), this data collection tool is used to gather data from professionals and community leaders and requires careful respondent selection by the researcher to ensure that the individuals selected have the relevant information. Cossham and Johanson (2019) state that this qualitative data collection method involves a conversation with a person who is knowledgeable about the phenomenon under investigation. This data collection tool is generally administered to individuals who have first-hand knowledge of a phenomenon or process (Innes et al., 2017). These 'experts' possess the relevant understanding to provide insight into the nature of the problem and give recommendations. In this study, the key informant who was selected was the Logistics Manager at the CIPLA Medpro Manufacturing Mobeni branch. The purpose of this selection of respondents was attributed to the assumption that the Logistics Manager is the most knowledgeable individual on logistics-related issues and may have a deeper insight into the barriers to green logistics affecting CIPLA Medpro Manufacturing. According to Cossham and Johanson (2019), the two common types of key informant interviews that are used are telephonic interviews and face-to-face interviews. For the purpose of this study, the method of telephonic key informant interviews was chosen due to the global pandemic and the availability of the respondents.

4.5.2 Data collection procedure

A mixed-methods approach to conduct this study and, therefore, used more than one data collection instrument. The two instruments used in data collection are surveys and a key informant interview. Therefore, each instrument required a different data collection procedure. The data collection process of this study was heavily impacted by the emergence of the COVID-19 global pandemic, which caused nationwide restrictions. A combination of face-to-face, online and telephonic modes of communication to gather data were used.

4.5.2.1 Survey data collection procedure

The approach used involved three lines of communication to improve respondent response rates. Firstly, the Human Resource Manager and Departmental Manager were contacted to discuss the survey with staff. Next, emails were sent to staff members who had an email address, this was provided by the Departmental Manager. Finally, the researcher went on-site to meet respondents who did not have access to email and administered face-to-face surveys to respondents. During the data collection process, the researcher engaged in communication with the Departmental Manager to identify if respondents were having any difficulties with completing the survey. Some respondents requested that the researcher provide them with a physical copy of the survey as it was easier to complete, which was then printed and given to the respondents. The data collection process is highlighted in Figure 4.3, which indicates the three phases of data collection.

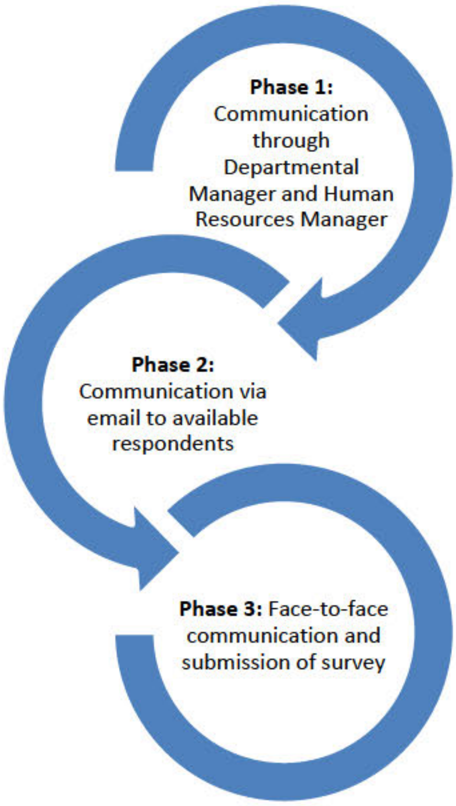


Figure 4.3: Data collection process

The data collected was submitted in three methods by respondents. Firstly, through face-to-face submission of printed surveys which were completed by respondents. Secondly, respondents scanned through the completed surveys to the researcher's email address. Thirdly, some respondents received their printed surveys and took them home to be completed. Once completed, they were left at reception in a sealed envelope for collection.

4.5.2.2 Key informant interview data collection process

The respondent was contacted via email to get consent and to determine the availability of the respondent. The respondent indicated a preference to conduct the key informant interview telephonically as opposed to online. Prior to the interview, the respondent indicated a preference to have the interview transcribed rather than recorded. The respondent's responses were recorded through transcription and note-taking as opposed to a voice recording. A key informant interview guide was used to ensure that questions were relevant and related to the research questions posed by the study. The key informant interview guide is included in Appendix 2. During the interview, probing questions were used to gain a deeper insight into related themes. Note-taking was conducted throughout the interview process to highlight critical information.

4.6 Reliability, validity and accuracy of the study

Reliability and validity are two key factors that the study focused on when conducting the data collection, as well as the data analysis. Procedures were observed to ensure that the data was both reliable and valid. According to Kaushik (2020), data validity and data accuracy are directly related to one another and by ensuring that the data is valid the overall accuracy of this study is improved. These aspects are indicated in Figure 4.4.

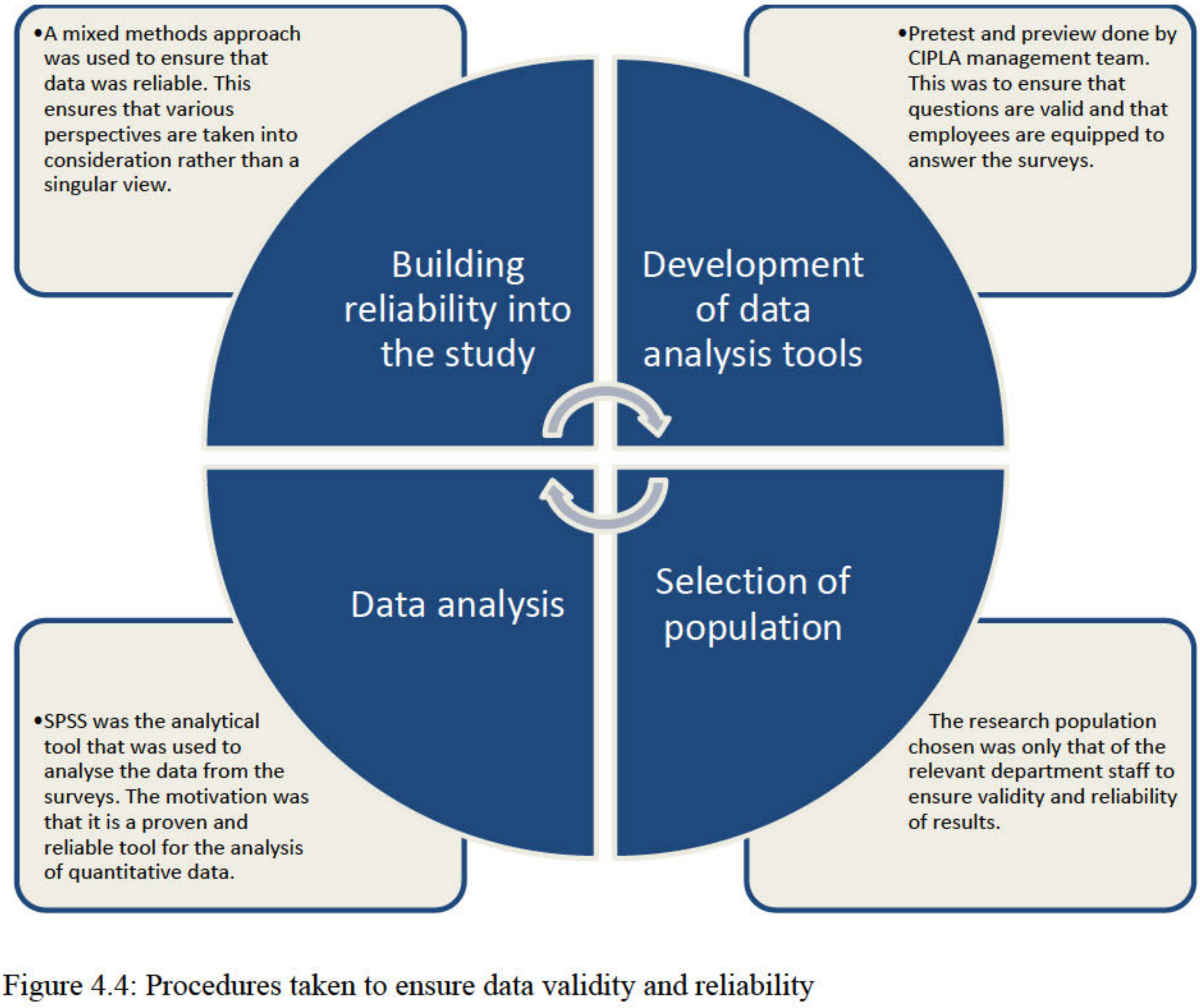


Figure 4.4: Procedures taken to ensure data validity and reliability

4.6.1 Reliability

Jang (2020) identifies reliability as the extent to which the questions used in a study can consistently produce the same results each time it is repeated. Data sets can be considered valid if the values are confined within a domain (Jang, 2020). Kyeong and Nam (2022) suggest that data reliability reflects the completeness and accuracy of the data. In this study, surveys and a key informant interview were used as the data collection tools. Only one survey was used and replicated for each respondent. Therefore, reliability is built into the data collection process by ensuring that the same instrument is used consistently and thus would reproduce the same results if the process is repeated. The method of transcription was used to ensure that information provided by the key informant was taken word-for-word as the use of a voice recorder was declined. During the interview, the interviewer would repeat the statement made by the respondent to ensure that it was taken down correctly and that the data collected was reliable. Probing questions were also used to delve deeper into the respondent's responses ensuring that clarity was provided on ambiguous responses. The interviewer also ensured that clarity was provided to the key informant when questions were posed to them during the interview.

4.6.2 Validity

According to Jang (2020), validity refers to the extent to which a survey instrument measures what the researcher aims to measure. Kaushik (2020) suggests that data validity is the degree to which data values are consistent within a defined domain. Desmet et al. (2021) state that the data validity of a research study is depicted by whether the study represents the true findings amongst individuals outside the study. Erhan et al. (2020) argue that there are two types of data validity, which are internal and external. Internal data validity is defined by the extent to which the results represent the population that is studied, whilst external validity is determined by the generalisability of the study outside the population (Erhan et al., 2020). The impact of a lack of internal validity suggests that the results of the study are inaccurate and do not depict the population's perceptions. The impact of a lack of external validity is that the results of a study cannot be generalised to populations that are not similar to that of the study.

To ensure that the study is valid, research questions that were based on the problem being investigated were first identified. These research questions were then used to create the survey to ensure that the questions were relevant. The reason for this step was to ensure that the questions posed in the survey were valid and fit the purpose. The survey was then submitted to the CIPLA team and Departmental Manager for review. The purpose was to ensure that CIPLA management would highlight any concerns or questions that they felt were not fit for the purpose. The Department Manager was the final reviewer of the survey before it was accepted by the organisation. A census study of the Logistics Department was conducted to ensure that the results have a high level of internal validity. An interview guide was used to improve the validity of the questions to the key informant which served as a guide to ensure that all questions were related to the research objectives. The interview guide was sent to the CIPLA management team and department manager for review before it was used during the interview.

4.7 Pretesting the survey and key informant interview guide

To ensure that the survey was relevant and did not conflict with the principles of CIPLA, the survey and key informant interview guide were submitted to the Department Manager and Human Resource Manager prior to submission for review. No amendments were requested by the reviewers. The Department Manager attempted the survey to determine its relevance and appropriateness. The questionnaire was then approved for submission to CIPLA employees. The Departmental Manager also indicated comfort in answering questions that were closely aligned with the key informant interview guide.

4.8 Ethical considerations

Ethical protocols were complied with, including applying for ethical approval via the University of KwaZulu-Natal's Human and Social Sciences Ethics Committee. Ethical approval was granted, as per Appendix 6. The first ethical consideration was that all respondents were given self-determination to decide whether they wanted to participate or not. Should any respondent not want to participate, they had the option to decline the request. An informed consent letter was submitted to each respondent. Respondents were requested to fill out the consent letter prior to attempting the survey. If respondents did not accept, they would not have to participate in the study. This is to ensure that all respondents joined of their own free will.

The next ethical consideration that was taken was ensuring that all surveys were anonymous. Respondents did not fill in their names or personal details on their surveys. Only consent forms included the personal details of respondents, which ensured that surveys could not be tied back to any respondent. All surveys are stored in a secure place at the researcher's residence and will be submitted to the institution upon completion of the thesis. The only individuals who will have access to the information provided in the surveys will be the researcher and the supervisor, thereby ensuring that the information is kept confidential. A non-disclosure agreement was also signed, as per the request of CIPLA, to ensure that any sensitive information would not be leaked, which is attached as Appendix 5.

4.9 Data Analysis

The key informant interview is used for the purpose of process mapping and to gain insights into the sustainable initiatives that the institution is involved with. The information provided by the key informant is transcribed into meaningful information and used to identify processes within the organisation and to also determine cultural trends. The method of data collection used in the study for the survey was that of the SPSS. This is software that has been developed by International Business Machines (IBM) for the purpose of quantitative data analysis (Pedamkar, 2021). According to Pedamkar (2021), SPSS is commonly used for data analysis in the fields of marketing, education, research, government and healthcare sectors. According to Noels (2018), SPSS is one of the most effective tools that can be used to analyse data from surveys as it helps to process critical data in simple steps. This software also focuses on predictive models, and trend and variable analysis, which is the intention of the surveys (Pedamkar, 2021). SPSS also assists in the representation of data models by assisting through the plotting, reporting and presentation of data once it has been input into the system (Noels, 2018). Table 4.7 identifies the statistical methods of SPSS.

Table 4.7: Statistical methods of SPSS

Statistical Model	**Description**
Prediction	This can be used with a variety of data for identifying groups and including methodologies such as cluster analysis, factor analysis, etc.
Descriptive statistics	These are methodologies such as frequencies, cross-tabulation, and descriptive ratio statistics.
Bivariate statistics	These are methodologies like analysis of variance (ANOVA), means, correlation, nonparametric tests, etc.
Numeral outcome prediction	This refers to linear regression.

Source: Pedamkar (2021)

SPSS is involved with critical data handling and processing operations such as data transformation, regression analysis, ANOVA, multivariate analysis of variance and T-tests. These are described in Table 4.8.

Table 4.8: The SPSS software data analysis processes adopted

Process	Description
Data transformation	This technique is used to convert data from its original format into meaningful information. After the conversion process, the data is kept in a singular location so that it is easy to manage.
Regression analysis	This is used to understand the relationships between dependent and independent variables within the data file. It also identifies the effect that a change in the value of an interdependent variable can affect a dependent variable. The primary purpose of this is to determine the type of relationship shared between variables.
Multivariate analysis of variance	This is a method used to compare data of random variables whose data is currently unknown. This technique can also be used to analyse populations and the various factors that affect them.
ANOVA	It is a statistical approach used to identify differences between groups, events, and processes. This method also identifies the feasibility and effectiveness of various methods.
T-tests	This is used to determine the difference in the two sample types and the difference in the interests of the two groups.

Source: Noels (2018: 5-8)

The method of quantitative data analysis used in this study is descriptive statistics through the analysis of frequency distribution. According to Arora and Faisal (2022), descriptive statistics summarises data and assists by identifying patterns within the data set. Jeblick et al. (2023) state that descriptive statistics is used to simplify complex quantitative insights. According to Plaue (2023), frequency distribution is used to identify how many times an instance occurs in a data set and the number of different responses made by respondents. This can be used to determine the spread of responses and themes that are prominent in the data set through graphical or tabular formats (Plaue, 2023). According to Fang et al. (2023), software such as SPSS can be used to establish frequency tables, which is the statistical analysis tool that is used in this study. The type of frequency table that is used in this study is an ungrouped frequency table. The purpose of the selection of this method of frequency table is to ensure that the method of data analysis used correlates with the data collection tool. The survey consists primarily of rating scale, matrix and ranking questions which make ungrouped frequency tables the most effective in correlation with the SPSS data analysis software, according to Loo et al. (2023). Qualitative responses by the key informant were also undertaken thematically and included in relevant sections of the quantitative data analysis. This was done to gain deeper insights into the patterns and themes that were reflected in the data depicted by the ungrouped frequency table. According to Arora and Faisal (2022), descriptive statistics focuses on the information provided by the data set and does not go beyond the data. Vaghefi and Tulu (2019) state that the use of qualitative data provides critical information that can provide insights that relate to and go beyond the data set, which, therefore, provides a more holistic depiction of the themes and patterns identified within the data.

4.10 Limitations of the study

The study is focused on a South African view of the barriers to green logistics and, therefore, caution should be exercised to generalise results to different countries. This suggests that the findings of the study may also not be generalisable to different countries due to the uniqueness of geographic phenomena and various external factors that directly impact GSCM/ green logistics within the pharmaceutical industry in South Africa. Due to accessibility constraints, this study is limited to the logistics staff at CIPLA Medpro Manufacturing, which suggests that the insights of the various departments will be omitted. Although this study only focuses on the Logistics Department, potential insights may be overlooked by limiting the study to only one department at CIPLA Medpro Manufacturing. Since logistics involves a number of different interrelating departments and operations, the inclusion of the various departments at CIPLA Medpro Manufacturing would have added different perspectives to the research findings. The research is also industry-specific, and due to the unique nature of the pharmaceutical industry, the results from the study may be applicable to organisations that operate within the pharmaceutical industry. Therefore, the findings of the study cannot be generalised to organisations that operate in other industries. The study has also only been conducted at one site of CIPLA Medpro Manufacturing as it was the only manufacturing site at the time and due to accessibility constraints. To gain a more holistic perspective, future research should include all CIPLA Medpro Manufacturing sites in South Africa. Findings from a single branch may not be representative of the entire company. Different branches within the same company can have varying cultures, management styles, customer bases, and operational challenges. Therefore, conclusions drawn from one branch may not apply to others. The barriers experienced between the different sites could have also impacted the results due to elements such as accessibility and provincial government regulations. Factors such as local market conditions, regional differences, or specific branch-level dynamics can influence the results of the study. These factors may not be applicable or relevant to other branches or the company as a whole. The study may be biased towards the unique circumstances of that particular branch, leading to findings that are not applicable more broadly. This specificity can limit the study's utility in informing broader corporate strategies or policies. Many corporate decisions and policies are made at the organisational level, rather than at individual branch levels. Research conducted solely in one branch may miss out on these higher-level impacts and interactions.

Without data from other branches or comparative analysis, it can be challenging to assess how the branch being studied performs relative to others within the company. This limits the ability to identify best practices or areas for improvement as well as develop a holistic view of all the barriers that impact green logistics at CIPLA Medpro Manufacturing. Causal relationships established in one branch may not necessarily apply to other branches due to differing conditions or contexts. This makes it harder to confidently attribute outcomes to specific factors.

The study also used a single key informant to develop a qualitative perspective on key information pertaining to the research. This also allows for personal biases to carry significant weight in the study. Although the key informant was purposively chosen the study would have benefitted from more key informant interviews with key role players within the logistics department at CIPLA Medpro Manufacturing.

As a result of time and accessibility limitations, the only organisation that participated in the study is CIPLA Medpro Manufacturing, and, therefore, the study may not give a holistic view of the barriers faced by all the pharmaceutical industries in South Africa. Although it could be suggested that the study, to some degree, could be generalised to other pharmaceutical companies operating within South Africa, further research would be required. It has been identified that policies between CIPLA branches vary globally, therefore, the results from the study cannot be generalised between branches. Due to the nature of geographic variances such as legislation, economic situations and political stability, the findings of this study cannot be generalised between local and international branches of CIPLA Medpro Manufacturing.

4.11 Conclusion

This Chapter outlines the research methodology used in the study and provides insights into the motivation behind the methodology. Elements such as the research design, data collection tools, sample population and methods used to incorporate data validity and reliability form the core of this Chapter. Techniques that were used to gather data are highlighted with the inclusion of the considerations that were made during the study. Finally, the Chapter concludes with a discussion of the data analysis tools used as well as the ethical considerations that were followed.

CHAPTER FIVE: ANALYSIS, RESULTS AND DISCUSSIONS

5.1 Introduction

This Chapter focuses on the analysis of the data that has been gathered and transforming it into meaningful information. According to Babbie et al. (2022), data analysis involves a more detailed approach to recording, analysing, disseminating, and presenting data findings in a way that is easy to interpret and make decisions. This is the aim of this Chapter as it focuses on interpreting the data gathered during data collection and identifying trends, linkages between respondents' insights and the literature, and relationships between variables.

5.2 Green logistics initiatives conducted at CIPLA Medpro Manufacturing

Insights derived from both the qualitative and quantitative data collection instruments were used to identify the green logistics and GSCM initiatives that are conducted at CIPLA Medpro Manufacturing. The key informant identified seven core sustainable practices that are currently being conducted by the warehouse team, which are highlighted in Figure 5.1 and supported by the survey responses in Table 5.1, Table 5.2, and Table 5.3. These initiatives are aligned with CIPLA Medpro Manufacturing's ambitions for their 2025 and 2030 sustainable goals.

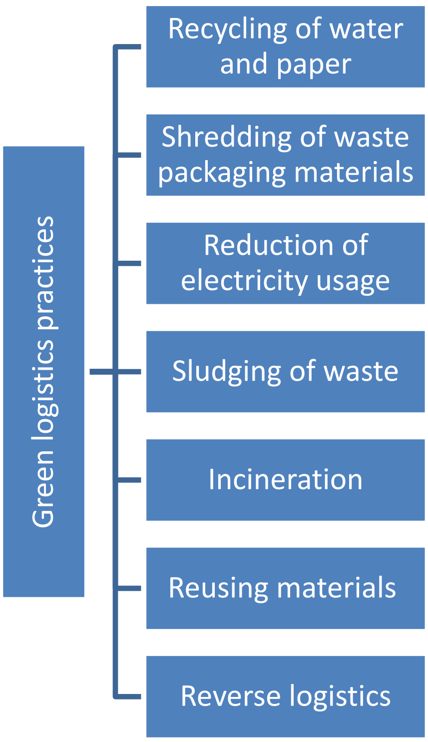


Figure 5.1: Current green logistics initiatives conducted at CIPLA Medpro Manufacturing

As shown in Table 5.1, Table 5.2, and Table 5.3, respondents' knowledge of different aspects of green logistics initiatives was probed emanating from the literature review (Bilderback, 2023; Nureen et al., 2023; Panwar et al., 2023; Srivastava et al., 2023). Specifically, the respondents were asked whether CIPLA Medpro Manufacturing used the initiative sometimes, always or never. If respondents indicated the initiative was never used, they were further asked why it was not used. For the purposes of analysis, respondents who indicated sometimes and always will be grouped to indicate that the initiative was undertaken to some degree. A number of GSCM initiatives have been identified within the survey that are not the direct responsibility of the logistics department as shown in Table 5.1-5.3, however, they are still a part of the green initiatives that are conducted within the supply chain at CIPLA Medpro Manufacturing. These are included in the discussion as they have relevant information with regard to the research objectives. Table 5.1 depicts the respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating directly to green logistics. As previously discussed, the adoption of environmentally-friendly practices within the warehouse can be identified as a green logistics initiative known as green warehousing (Agility, 2021; Morrison, 2022). Bartolini et al. (2019) state that this sustainable initiative promotes better environmental performance within the warehouse and reduces costs through the better utilisation of resources.

Table 5.1: Respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating directly to green logistics (n=30, in %)

GSCM practice	No response	Never	Sometimes	Always	If never, why? (multiple responses)
Inventory management	3.3	6.7	60	30	Unaware of alternatives
Reverse logistics (reselling, refurbishing, remanufacturing, reusing and recycling goods)	-	10	70	20	Unaware of alternatives Not a core competency High financial implications Waste is recycled
Green warehousing (including eco-friendly features such as solar walls, on-site recycling, etc.)	6.7	26.7	53.3	13.3	Unaware of alternatives Lack of know-how High financial implications Not a core competency Difficult to implement
Shipping in bulk/ load optimisation	3.3	6.7	60	30	High financial implications Unaware of alternatives Direct loads
Use of low-carbon emission vehicles	6.7	23.3	50	20	Unaware of alternatives Lack of know-how High financial implications
Route optimisation	3.3	13.3	70	13.3	Unaware of alternatives Lack of know-how Routes are planned Difficult to implement
Reduced fuel consumption through the use of various strategies	6.7	10	66.7	16.7	Unaware of alternatives Lack of know-how High financial implications

In terms of inventory management, 90% of the respondents indicated that it is an initiative undertaken to some degree. Two respondents indicated that this initiative is never conducted and that is because CIPLA Medpro Manufacturing is unaware of alternatives. The context in which this is meant is unknown and may serve as a recommendation to improve data collection tools for future surveys. The limitation of sustainable inventory management which was identified in the key informant interview includes a lack of flexibility due to the length and complexity of the pharmaceutical supply chain.

According to Table 5.1, the majority of the respondents agree that CIPLA Medpro Manufacturing conducts reverse logistics initiatives to some degree (90%). This suggests that the organisation realises the financial and environmental benefits that are associated with this practice, which is aligned with assertions by Zarbakhshnia et al. (2020). Reverse logistics has been identified as an important GSCM initiative in the pharmaceutical industry as noted by Barbosa-Povoa and Pinto (2020), Khan et al. (2021), Makaleng and Lambert (2022) and Oliveira et al. (2023). According to the key informant, the Logistics Department has faced a great deal of difficulty in the form of a lack of visibility and control mechanisms to promote the backward movement of expired or obsolete products. Products are often disposed of incorrectly through landfills and dumping sites, which negatively impacts the environment and human health. The key informant highlights that the amount of obsolete products that are returned to CIPLA Medpro Manufacturing is low, which suggests that customers do not actively participate in the reverse logistics process. Ten percent of the respondents indicated that reverse logistics is never conducted at CIPLA Medpro Manufacturing, which suggests that these respondents are either poorly informed or lack an understanding of reverse logistics.

Green warehousing encompasses a few practices, as noted by Agility (2021) and Mashud et al. (2021). The context in which this question was asked refers to energy-saving practices (including eco-friendly features such as solar walls, on-site recycling, etc). Approximately a quarter of the respondents (26.7%) indicated that this initiative is never undertaken at CIPLA Medpro Manufacturing for the following reasons: unaware of alternatives, lack of know-how, high financial implications, not a core competency and it is difficult to implement. On the other hand, more than half of the respondents (53.3%) indicated that this initiative is being undertaken to some degree. According to the key informant, current green logistics initiatives that are still in the planning phase are solar lighting and the installation of fluorescent lighting, which indicates that there is some awareness of the need to improve energy-saving practices.

Shipping in bulk and load optimisation, use of low-carbon emission vehicles, route optimisation and reduced fuel consumption through the use of various strategies can be grouped under green transportation and distribution initiatives (Lutman and Strojan, 2023; Mell and Whitten, 2021; Simm, 2021; Shamsuddoha et al., 2023). On average, 82% of the respondents indicated that green transportation and distribution initiatives are being undertaken by CIPLA Medpro Manufacturing to some degree (average of respondent's responses on the three green transportation and distribution initiatives). On average, 13% of the respondents indicated that these initiatives are never practised due to barriers such as high financial implications, being unaware of alternatives to current practices and the lack of know-how. The theme of a lack of knowledge is identified through the lack of know-how and a lack of awareness of alternatives, which may indicate a lack of understanding of GSCM practices in CIPLA Medpro Manufacturing among some staff members of the Logistics Department. The respondent's insights on the adoption of green transportation and distribution initiatives are further discussed below.

Load optimisation initiatives were undertaken by the organisation to some degree, according to 90% of the respondents. This correlates with the information provided by the key informant who identified that CIPLA Medpro Manufacturing makes bulk purchases from suppliers to consolidate costs for materials that are transported across long distances. Two respondents stated that CIPLA Medpro Manufacturing never practices this initiative due to barriers such as high financial implications, being unaware of alternatives to current practices and the use of direct loads. According to Wang et al. (2020), the process of reducing pollution within the transportation process is considered the greening of the logistics operations within an organisation. Green logistics initiatives generally reduce the costs associated with logistical processes and improve environmental performance (Wang et al., 2020).

Cipla Medpro Manufacturing utilises low-carbon emission vehicles to some degree, according to 70% of the respondents. In contrast, 23.3% of the respondents indicated that this initiative is never conducted due to high financial costs, a lack of know-how and being unaware of alternatives. Similar to load optimisation, the decision to use low-carbon emission vehicles is aligned with the definition of green logistics put forth by Wang et al. (2020). This is also aligned with assertions by Ociepa-Kubicka (2019) who identifies that the reduction in consumption of natural resources and pollutants within the Logistics Department is considered the greening of the supply chain.

More than 80% of the respondents identified that CIPLA Medpro Manufacturing conducts route optimisation to some degree while 13.3% of the respondents indicated that this initiative is never conducted with the identification of barriers of being unaware of alternatives, lack of know-how, planning of routes and difficulty in implementation. The planning of routes by the organisation limits the full optimisation, however, due to importing materials, this initiative may be limited to locally sourced materials, as indicated by the key informant. The key informant further added that route optimisation is focused on reducing the distance travelled by vehicles for distribution and transport purposes, which results in a minimisation of emissions.

The reduction of fuel consumption is conducted to some degree by CIPLA Medpro Manufacturing, according to 83.3% of the respondents. This initiative is aligned with the assertions by Ociepa-Kubicka (2019), which highlights that a reduction in consumption within the logistics processes is related to green logistics. On the other hand, 10% of the respondents indicated that the organisation never conducts this practice due to a lack of knowledge in the form of being unaware of alternatives and a lack of know-how. One respondent identified a high financial cost as a barrier to this initiative, which goes against assertions by Al Breiki and Nobanee (2019) who assert that a reduction in consumption would result in a decrease in costs, not an increase. This highlights a lack of knowledge among some of the respondents. Two respondents did not respond to this question.

Table 5.2 depicts the respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating to procurement. According to Elbarky et al. (2023) and Khan et al. (2023), green procurement initiatives are essential in the establishment of successful green supply chains.

Table 5.2: Respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating to procurement (n=30, in %)

GSCM practice	**No response**	**Never**	**Sometimes**	**Always**	**If never, why? (multiple responses)**
Green procurement (sourcing from environmentally responsible partners)	6.7	10	70	13.3	Unaware of alternatives Lack of know-how
Local sourcing of goods and services/ use of local suppliers	6.7	3.3	76.7	13.3	Unaware of alternatives Lack of knowledge

More than 80% of the respondents indicated that both green procurement initiatives and initiatives to source goods/ services from local suppliers were undertaken by CIPLA Medpro Manufacturing to some degree. One respondent indicated that these initiatives are never done in CIPLA Medpro Manufacturing, further elaborating that this was due to a lack of knowledge and/ or being unaware of alternatives. Green procurement was not highlighted as a practice being conducted by the warehouse team by the key informant, which implies that although green procurement is not under the direct responsibility of the Logistics Department, most employees are aware of the green procurement initiatives being undertaken by CIPLA South Africa. This may be due to adequate support and integration of operations. The benefits of green procurement have been previously discussed by Ayimba (2020), Galeazzo et al. (2021), Khan et al. (2023) and Shahzad et al. (2023). The key informant did indicate that while certain products cannot be sourced locally, due to the scarcity of certain resources, CIPLA Medpro Manufacturing does sometimes source locally when possible. According to Galeazzo et al. (2021), the use of local suppliers is aligned with green procurement as it reduces the length of supply chains and, therefore, minimises the waste and pollution caused within the supply chain. Ninety percent of respondents identified that this initiative is conducted by the organisation to some degree which indicates that CIPLA Medpro Manufacturing is implementing the local sourcing of materials within their supply chain. This suggests that CIPLA Medpro Manufacturing is involved in the reduction of waste through green procurement initiatives.

Table 5.3 depicts the respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating to green production and consumption. As identified in the literature review, green production and consumption are concepts associated with the creation of a circular economy and these initiatives are critical in ensuring that sustainable goals are met (Butt et al., 2023; Halder et al., 2020; Jain et al., 2020; Kirchherr et al., 2023; Kim, 2021; Nascimento et al., 2018; Rossi et al., 2020; Sharma et al., 2021; Timm et al., 2023; Xiong et al., 2023).

Table 5.3: Respondents' insights into the green logistics initiatives undertaken by CIPLA Medpro Manufacturing relating to green production and consumption (n=30, in %)

GSCM practice	No response	Never	Sometimes	Always	If never, why? (multiple responses)
Recycling (for example, paper)	-	3.3	46.7	50	High financial implications
Reducing waste generation and proper disposal of waste	6.7	3.3	60	30	Lack of know-how
Being a responsible corporate citizen (corporate social responsibility projects and investments)	6.7	3.3	63.3	26.7	Lack of know-how
Green production (using processes that are energy efficient and generate less waste)	3.3	10	63.3	23.3	Unaware of alternatives Lack of know-how Not a core competency Strict production policies
Using environmentally -friendly materials	6.7	13.3	60	20	Unaware of alternatives Not a core competency Lack of know-how
Green packaging uses environmentally -friendly packaging, recycling and reusing	3.3	23.3	60	13.3	Unaware of alternatives Lack of know-how High financial implications Not a core competency Difficult to implement
Reuse (for example, reusing durable packaging in supply change)	3.3	23.3	40	33.3	Lack of know-how Not a core competency Unaware of alternatives
The green design of goods/ products (e.g. easier to transport, uses less energy, etc.)	6.7	30	46.7	16.7	Lack of know-how High financial implications Not a core competency Difficult to implement Unaware of alternatives

Overall, more than 60% of the respondents indicated that each of the following initiatives relating to green production and consumption is undertaken by CIPLA Medpro Manufacturing to some degree: recycling (96.7%), reducing waste generation and proper disposal of waste (90%), green production (86.7%), using environmentally-friendly materials (80%), green packaging (73.3%), reuse (73.3%), and the green design of goods/ products (63.4%). These initiatives are further discussed below in relation to the key informant insights.

The recycling of water and paper is conducted within the Department using waste management systems and recycle bins, which are positioned within office spaces and administration areas in the warehouse. The logistics team separates the different types of waste prior to the disposal process to ensure that waste is not mixed. Some of the types of waste that are common within the warehouse are plastic and paper. Based on survey responses, 96.7% of the respondents highlighted that recycling was conducted within the Logistics Department to some degree. It is, therefore, evident that this green logistics initiative is being conducted within the organisation.

According to the key informant, the shredding of waste material is an initiative that was conducted within the Logistics Department to drive environmental performance. The use of shredding can be for different materials, but the most common is the foil that is used for packaging medication. This material cannot be recycled if it comes into contact with medication and, therefore, needs to be disposed of after the manufacturing process. These by-products can come in the form of manufacturing errors, off-cuts, and leftover materials. Once these materials come back to the warehouse, they are then disposed of by shredding using a shredder to minimise their impact in landfill sites. The reduction of waste improves the environmental performance of the organisation.

Furthermore, the sludging of waste is another process conducted by CIPLA Medpro Manufacturing to safely dispose of the hazardous material that is formed during the production process. This waste material has active pharmaceutical ingredients that could have severe negative effects on the environment and human life, as noted by Moghaddam et al. (2023), therefore, the waste is disposed of using this process and then handed over to a waste disposal company. The waste disposal company then finds safe means of disposing of the waste. CIPLA Medpro Manufacturing has limited control over the waste disposal process once the process is handed over. The concern about the proper disposal of waste has given rise to a new business process, which is referred to as incineration. This process is conducted through the burning of waste to reduce environmental impact and offer better control over the waste disposal process.

CIPLA Medpro Manufacturing has created an incineration plant in Oliphantsfontein to facilitate this process. The drawback of this process is that the waste material must now be transported to the incineration plant, which increases transport costs and the carbon footprint of the organisation. During the incineration process, waste is burned in a furnace at high temperatures, which reduces the waste products to ash. The process of sludging is currently being phased away for the process of incineration as more products are being shipped off for incineration. This process is also a form of green production and proper waste disposal, which improves the environmental performance of an organisation. The reduction of waste generation and proper disposal of waste is undertaken by CIPLA Medpro Manufacturing to some degree, according to 90% of the respondents. This is substantiated by information provided by the key informant, who made mention of various practices such as waste reduction and the hiring of waste disposal companies to facilitate proper disposal. According to Negi et al. (2021), the proper disposal of materials reduces instances of pollution and improves the environmental performance of an organisation. This suggests that this initiative is focused on the reduction of waste and pollution created in the manufacturing process.

Around 86.7% of the respondents indicated that CIPLA Medpro Manufacturing undertakes green production to some degree. This may suggest that some of CIPLA Medpro Manufacturing's production processes are green whilst others are not. This is an understandable conclusion, as production within the industry is governed by regulations and legislation, according to Epstein et al. (2018). The initiative of electricity usage monitoring and reduction contributes to green production as it seeks to minimise the impact of manufacturing processes on the environment, as noted by Nguyen et al. (2019).

As indicated by the key informant, the reduction of electricity usage is done using energy monitoring instruments which identify the amount of energy used within the Department. This amount is recorded and highlighted on the notice board every week to determine whether energy usage is above or below the recommended usage. Although the usage amount is combined with the other operational departments, the logistics manager is tasked with driving down usage should it go above the recommended threshold. The key informant states there are guidelines for electricity reduction within the department, which are associated with the usage of lights and equipment, which are monitored on a regular basis. The logistics team is tasked with switching off lights and other devices that consume energy when they are not in use to reduce electricity usage and to both improve environmental performance and reduce energy costs within the organisation. Currently, the incorporation of fluorescent lighting and solar energy is planned to be rolled out within the Logistics Department to further reduce electricity usage. The high response rate indicates that the logistics team are aware of this green logistics initiative.

The use of environmentally-friendly materials and green packaging are key elements of green product design as noted by the assertions of Bose et al. (2023), Hong et al. (2019) and Lutfi et al. (2023). According to Hao et al. (2020), green design is focused on creating products that are more environmentally-friendly throughout their life cycles and suggests that an organisation is establishing the foundation for a circular economy. In terms of green product design, 63.3% of the respondents indicated that CIPLA Medpro Manufacturing uses this initiative to some degree. Interestingly, the use of environmentally-friendly materials and green packaging relates to green product design, yet a greater number of respondents indicated that these initiatives are being practised to some degree (80% and 73.3%, respectively). Overall, based on the responses, the majority of the Logistics Department is aware of these green logistics initiatives. This was supported by the key informant.

The reuse of materials is also conducted within the Logistics Department, which is a process that is overseen by the logistics manager. The key informant identified that the reuse of materials is not always possible due to the sensitivity of the production process within the pharmaceutical manufacturing process. Certain materials cannot be reused as they risk the efficacy of a product, which in turn impacts the effect of the product on human health. According to the logistics manager, when materials are reused, they are first sent for a quality assurance test to make sure that they are still suitable for use, and this generally only applies to materials that are not active pharmaceutical ingredients.

The reuse of materials is generally limited to inactive pharmaceutical ingredients, which are less impactful on human health but still form a critical element of the production process. Other materials that are reused are packaging materials that can be retested to ensure that they will uphold the integrity of a pharmaceutical product and secondary packaging materials. Primary packaging materials are not reused as they come into direct contact with the pharmaceutical product, and, therefore, extreme caution needs to be exercised with these materials. If the primary packaging material is damaged or compromised in any way, they are disposed of to ensure that the quality of the product is upheld. According to 73.3% of the survey respondents, the organisation conducts the reuse of materials to some degree, which corroborates the information provided by the key informant. The respondents who indicated that the organisation does reuse materials (23.3%) may highlight that the team is aware that not all materials can be reused. According to Matthews et al. (2021), the process of reusing materials is critical in the creation of a circular economy and indicates that an organisation is reducing its environmental impact through the minimisation of waste.

Lastly, being a responsible corporate citizen via corporate social responsibility projects and investments was also added as a GSCM initiative. According to the responses, 90% of the respondents indicated that the organisation practices being a responsible corporate citizen to some degree. This was supported and substantiated by the key informant in relation to the various initiatives conducted by the organisation, such as the “Wisdom of the Ages” programme and the “Out of the Mouths of Babes” initiative. One respondent indicated that CIPLA Medpro Manufacturing never practices this initiative, which goes against the majority of survey responses as well as the key informant interview insights. Two respondents did not answer. The cause for the variation is most likely a lack of insight into CIPLA Medpro Manufacturing's corporate social responsibility projects by some of the respondents.

According to the key informant, current green logistics initiatives that are still in the planning phase are solar lighting and the installation of fluorescent lighting, the replacement of diesel forklifts with the battery-operated version, training for departments on good environmental practices, and the complete removal of the sludging processes for a complete transition to incineration. Although there are a number of green logistics initiatives still being developed, it is evident that CIPLA Medpro Manufacturing is focused on achieving its Sustainable Development Goals.

5.3 Perceptions and attitudes of green logistics staff members towards climate change and environmental strategies at CIPLA Medpro Manufacturing

According to Gursoy et al. (2019), staff perceptions and attitudes directly impact the success of sustainable business initiatives as they are the drivers of these practices within the business.

Information from the survey provides the foundation for the analysis of staff perceptions, as these results depict the general trend within the Logistics Department. A variety of questions were used to develop an understanding of the Department's staff perceptions in a number of different settings and to probe deeper into the motivation behind respondents' responses.

All respondents were from the Logistics Department at CIPLA Medpro Manufacturing. The majority of the respondents in this study were operational-level employees. The highest level of education was that of either a diploma or certificate, which was closely followed by those who had completed secondary schooling. The majority of the respondents in this study were between the ages of 35 to 44 years. This indicates that the sample consists of mature and moderately educated employees. This aligns with the assertions of Hassim (2021) and Tomomi and Shinji (2021), who indicate that respondents who are between the ages of 18 and 45 are more likely to respond to sustainable initiatives due to their exposure to social media and other forms of awareness.

Table 5.4 required the respondents to identify the top 5 most important issues that face society and business. Respondents were only allowed to choose five factors for society and business, respectively. The aim of this question was to determine how respondents prioritise environmental issues as opposed to other factors that impact on society and business performance. This question also provides insights into the concerns that impact working-class individuals in South Africa and identifies the issues that take precedence over the implementation of sustainable development. These perceptions provide insights into whether respondents prioritise and understand the importance of sustainable development and sustainable initiatives. For the purposes of analysis, results were arranged from the highest to lowest for societal factors and responses were grouped from frequencies of 50% to 100%, 20% to 49% and 0% to 19%. All factors that were within the range of 50% to 100% indicate that at least half or more of the respondents agreed that it was important for society or business. The responses that ranged from 20% to 49% indicated that at least one to two-fifths of the respondents highlighted that this factor was important thus making it moderately important to the sample population. The responses that ranged from 0% to 19% suggest that less than one-fifth of the sample population considered it important, which suggests that these are insignificant factors for business or society, according to their perceptions. These groupings are used to further discuss the results presented in Table 5.4.

Table 5.4: Respondents' perceptions on important issues facing society and businesses (n=30)

	Most important for society		**Most important for business/ industry**	
	Frequency	**%**	**Frequency**	**%**
Education	24	80	15	50
Health	24	80	4	13.3
Career/ job/ employment	22	73.3	23	76.7
Safety and crime	16	53.3	17	56.7
Famine and hunger (food security)	15	50	3	10
Poverty	11	36.7	8	26.7
Quality of life	11	36.7	4	13.3
Financial situation	9	30	20	66.7
Corruption	7	23.3	21	70
Conflict and war	4	13.3	5	16.7
Environmental issues	4	13.3	19	63.3
Population growth	2	6.7	7	23.3

Literature by Babuji et al. (2023), Lutfi et al. (2023), Madronich et al. (2023) and Narsai et al. (2021) was used to determine the factors that externally impact the prioritisation of environmental performance both from a societal perspective and within the industry. The most important factors affecting society, according to respondents, were education (80%), health (80%), career and employment (73.3%), safety and crime (53.3%) and famine and hunger (50%). Only 13.3% considered environmental issues as a core concern for society. This indicates that respondents prioritise personal well-being above that of the environment, which is aligned with that of Hopper (2020), who states that an individual can only consider the well-being of others once their basic needs have been satisfied. This is also aligned with assertions by Manea et al. (2023), Miroshnychenko and De Massis (2022) and Sesele and Marais (2023) that highlight the high levels of poverty, crime and lack of education in South Africa. According to Hale et al. (2019), Maslow's hierarchy of needs highlights that an individual will only prioritise the environment and society once their physiological needs are met and, therefore, validates the survey responses. The relevance of the sustainable development theory adopted for this study that incorporates Maslow's hierarchy of needs, as noted by Cherry (2021), Cui et al. (2021), Hopper (2020) and Pawsey et al. (2023) is also underscored. The significant factors facing business were career and employment (76.7%), corruption (70%), financial situation (66.7%), environmental issues (63.3%), safety and crime (56.7%) and education (50%). These factors are closely related to the pillars of economic and social sustainability, which focus on the well-being of an organisation and society as noted by Chen et al. (2021), Courtnell (2019), Otálora et al. (2021) and Sainati et al. (2023).

Education was identified as an important factor by 80% and 50% of the respondents for society and business, respectively. This is justified by Miroshnychenko and De Massis (2022) who suggest that education is a key factor in society as it is needed to make a society geopolitically stable. It leads to economic prosperity, reduces crime and violence in societies and finally, helps societies develop and improve (Miroshnychenko and De Massis, 2022). It is evident that respondents perceive that education is important for both society and business, which could be reflective that respondents perceive that education is an important link between improving societal and business performance. This ties into the internal stakeholder theory used in this study that focuses on employees' capacity and skills to support business processes to improve business performance, which is indicated by Elneel et al. (2023) and Freudenreich et al. (2020). Respondents' responses to education also relate to the social pillar of sustainability, according to Al-Omoush et al. (2022), Fahad et al. (2023) and Vasseur et al. (2022), that highlights the importance of quality of life and financial standing, which is linked to education. Responses are also aligned to the respondent's personal educational background, which was a question that was posed in the survey and yielded results that 36.7% of the respondents' highest qualification was secondary schooling and 63.3% completed a higher education qualification in the form of a certificate or diploma (50%), degree (10%) and postgraduate qualification (3.3%). This highlights that the minimum qualification of an individual working in the Logistics Department at CIPLA Medpro Manufacturing is matric whilst the majority furthered their studies, which indicates a general focus on education.

Health was identified as being important for society by 80% of the respondents but insignificant for business as it was only supported by 13.3% of the respondents. This correlates with sentiments shared by Yurdakul and Arar (2023) who state that according to Maslow's hierarchy of needs, health and wellness are essential aspects of an individual's well-being and, therefore, of society. It is a reasonable conclusion that most respondents identified health as a core concern to society as it is a reflection of their personal opinion of their health. Respondents identified that health is not a core area of concern to businesses, which could mean that respondents do not see a correlation between health and business. Good employee health can have a significant, positive impact on businesses' bottom line by improving productivity, reducing sick leave, lowering the rate of employee turnover, retention of skilled employees and improving company culture. Companies that incorporate and support employee health initiatives may improve employee awareness. Hopper (2020) highlights the importance of health and safety over financial concerns based on Maslow's hierarchy of needs.

According to the respondents, career and employment were identified as significant issues facing societies (73.3%) and businesses (76.7%). This identifies employment as the most important issue facing businesses in South Africa. South Africa is a developing country and, therefore, employment opportunities are an important element for both business and society in general. This is supported by Nomafu et al. (2023) who highlight that South Africa is still a developing nation due to the high levels of unemployment. The respondents' insights indicate that the logistics team acknowledge the importance of the economic pillar of sustainability to ensure that business can continue for the foreseeable future to create career and employment opportunities, which are noted by Al-Qudah et al. (2022). Respondents' responses are aligned with Polasky et al. (2019) who suggest that economic stability is paramount to the success of any country as it impacts the ability of a population to live harmoniously and sustain itself.

Safety and crime were identified as significant factors affecting both society (53.3%) and business (56.7%). This aligns with Robaj (2023) who highlights the impact of crime on both society and business. Safety is also indicated as the second most important need for human beings, according to Maslow's hierarchy of needs, as noted by Cherry (2021) and Hopper (2020). Crime can impact the social pillar of sustainability by diminishing social well-being and psychological sustainability in a community, according to Mock et al. (2019) and Zhanbayev et al. (2023). Due to the prevalence of crime in South Africa, respondents are more aware of its impact on society and business performance as they may have been exposed to it within their communities.

Respondents identified famine and hunger as being a significant factor impacting society (50%) but as an insignificant factor for business (10%). Based on the high level of unemployment in South Africa, it is understandable that food security would be an area of concern for society, which is supported by Jong et al. (2022). This is also one of the key components of the physiological level of Maslow's hierarchy of needs, according to Courtnell (2019). Respondents' responses are also aligned with the sentiments of Bozsik et al. (2022), who indicate that famine and hunger have a direct impact on social sustainability and, therefore, would be a priority for society and communities. In contrast, respondents identified that it is not a core element of the mandate of a business.

Corruption was identified as a significant contributing factor for businesses by 70% of the respondents but only as moderately important for society by 23.3% of the respondents. Respondents' responses are aligned with the sentiments of Kulmie et al. (2023), who identified corruption as a critical factor affecting businesses. Zeini et al. (2023) state that corruption impacts the core elements of an economy, and that, in turn, affects business operations adversely. Respondents' responses correlate with the insights of Gilsinan et al. (2023), who state that the impacts of corruption on a country's economy are that it creates insecurity within the economy and, therefore, leads to weak economic results, thus hindering business performance. The low level of importance assigned to corruption in society (23.3%) could be attributed to a lack of insight by respondents as it directly impacts society, as noted by Gilsinan et al. (2023). This is an area of concern as it either means that respondents do not believe that corruption affects societies or they are not aware of the impact of corruption in society.

The financial situation of businesses and individuals was identified as being a significant factor in business (66.7%) but only a moderately important factor for society (30%). Respondents' responses to financial performance being a core concern for businesses (66.7%) align with Díaz de Otálora et al. (2021) and Fischer et al. (2023), who state that the alignment of business processes to achieve financial stability is directly related to economic sustainability, which is a pillar of sustainable development and is a core purpose driving businesses. This is a reasonable response rate as businesses operate to generate a profit and, therefore, would need to pay careful attention to their financial situation to ensure that the economic pillar of sustainability is upheld, which is also indicated by Epstein et al. (2018) and Maciková et al. (2018). This was also supported by the key informant, who stated: "A core concern facing businesses would be ensuring that the business can continue to function for the foreseeable future. Therefore, improving profit margins would be a core concern for most businesses, especially in these uncertain times." However, it is important to note that while many respondents identified financial performance as being important to business, not all respondents followed the trend, which suggests that there could be other motivating factors driving businesses. Interestingly, only 30% of the respondents stated that financial performance was important to society, especially since 70% of the respondents identified career and employment as significant issues affecting societies. The question was also vaguely phrased, which could have led to confusion among respondents.

Environmental concerns were identified as being a significant factor for business by 63.3% of the respondents but in stark contrast, it was regarded as an insignificant factor for society (13.3%). Respondent perceptions are aligned with the assertions of Nguyen et al. (2023), Shao et al. (2020) and Zhang et al. (2023), who state that environmental concerns directly impact organisations in various ways and should, therefore, be a key concern. The information gleaned from the key informant indicates that the logistics team at CIPLA Medpro Manufacturing do engage in sustainable initiatives, such as green logistics in the workplace, which could also be a contributing factor to response rates. It is significant to note that almost the same proportion of respondents identified financial concerns (66.7%) as being as important as environmental concerns (63.3%). This suggests that respondents value financial standing in business and environmental concerns. Guth et al. (2020) argue that the financial benefit of an organisation should not come at the cost of future generations, which highlights that whilst profitability is important, there should be a balance between economic benefit and environmental sustainability.

There is an evident disparity between the importance of environmental concerns between businesses and society. This suggests that while the majority of the respondents see the importance of environmental issues for businesses, they do not see it as an important factor in their personal lives. This is an interesting finding, considering there have been global campaigns to raise awareness around environmental concerns, as noted by Pettinger (2018). Drawing back to the previous discussion concerning the high unemployment rate in South Africa (approximately 35%), it can be noted that the three basic levels of Maslow’s hierarchy of needs are not fulfilled by many South Africans. According to Chen et al. (2022) and Cherry (2021), the second level of Maslow’s hierarchy of needs identifies financial security as a core desire, which cannot be fulfilled unless an individual is employed or has a source of income, therefore, it may be a contributing factor to the low level of importance that is placed on environmental concerns.

Poverty was identified as being moderately important for both society (36.7%) and business (26.7%). This does not correlate with the responses on the financial situation in which it was considered as significantly important for business (66.7%) but does align with respondents’ responses for societal importance as it was identified as being moderately important (30%). This deviation could be associated with the poor formulation of the survey question, which was identified earlier. Adeyeye et al. (2023) highlight the significant impact of poverty on a country, and the statistics by Nomafu et al. (2023) highlight the high level of unemployment in South Africa. The moderate level of importance assigned to this factor may be related to respondents being aware of poverty in the country, but they are not experiencing it on a personal level as they are employed by CIPLA Medpro Manufacturing. These results also indicate that general trends in a population (such as high poverty and unemployment levels in South Africa) do not necessarily directly impact those who do not share these experiences.

Quality of life was identified as being a moderately important factor for society (36.7%) but insignificant for business (13.3%). Carpiniello (2023), Dery (2023) and Zeini et al. (2023) link quality of life to conflict, poverty and social sustainability as a whole. Conflict and war were identified as being insignificant for both society (13.3%) and business (16.7%). Carpiniello (2023) and Fanning et al. (2022) highlight the impact that conflict and war have on all pillars of sustainability. This result could be attributed to the current state of South Africa as it is not in a period of war or conflict. However, it is important to note that data was collected after the riots that had taken place in 2021 in South Africa, which would have most likely increased respondents' responses towards this factor. CIPLA Medpro Manufacturing was one of the sites impacted during the riot period.

Population growth was identified as an insignificant factor for society (6.7%) but moderately important for business (23.3%). The growth of the population directly affects the societal, economic and environmental pillars of sustainability, according to Rosenberg (2021). Similarly, Almulhim and Cobbinah (2023) state that population growth directly threatens sustainability as it places a strain on natural resources. The reduction in natural resources results in adverse effects such as famine, crime, environmental degradation and over-utilisation of resources, according to Bozsik et al. (2022) and Zhanbayev et al. (2023). The lack of importance attributed to this factor could be a result of South Africa being a developing country with a population of just under 60 million, so while the consequences of overpopulation are significant, it is not a pressing matter that is currently affecting the day-to-day lives of the general population.

Based on respondents' responses, it is evident that environmental concerns are only identified as important for business and not society. This highlights the perception that respondents believe that environmental concerns impact business performance more severely than society, which is not accurate, according to the literature, as previously discussed. Further questions are posed to better understand how respondents perceive sustainable initiatives in a personal capacity and whether respondents would move accountability of environmental performance on businesses alone.

Table 5.5 required respondents to rate important various environmental issues that were identified by Denchak and Turrentine (2021), Fetta et al. (2023), Olutola and Wichmann (2020), Shebitz et al. (2023), Shah et al. (2021) and Udeagha and Breitenbach (2023). The purpose was to highlight the respondents' awareness of various environmental concerns. For the purposes of the analysis of the results, one was considered as not important, two as slightly important, three as moderately important, four as important and five as very important. The data was arranged from highest to lowest based on which ratings were most important (rating between 4 and 5) to highlight the most significant environmental issues facing respondents.

Table 5.5: Most important environmental issues that impact the respondent/ respondent experiences based on a scale ranging from 1 (not important at all) to 5 (very important) or Don't Know (DK) (n=30, in %)

Issues	**1**	**2**	**3**	**4**	**5**	**DK**
Poverty	3.3	3.3	3.3	20	63.3	3.3
Traffic congestion		6.7	16.7	40	33.3	3.3
Land pollution (waste, litter)	-	3.3	23.3	26.7	43.3	3.3
Water pollution (contamination of rivers and sea)	-	10	23.3	23.3	33.3	10
Air pollution (from factories and cars)	-	13.3	36.7	6.7	33.3	10
Extreme weather conditions, for example, floods, droughts, etc.	3.3	16.7	13.3	20	26.7	20
Ozone depletion	-	3.3	30	23.3	23.3	20
Hazardous waste (chemicals, radioactive, medical)	-	10	33.3	10	33.3	13.3
Chopping down trees and forests	6.7	10	23.3	23.3	20	16.7
Loss of wildlife (animals)	6.7	-	46.7	16.7	26.7	3.3
Population explosion	-	13.3	26.7	10	20	30
Genetically modified crops	6.7	6.7	33.3	13.3	10	30
Pesticides and herbicides	20	10	13.3	6.7	13.3	36.7
Poor farming practices	6.7	16.7	33.3	6.7	13.3	23.3
Nuclear power	36.7	13.3	10	10	3.3	26.7
Fossil fuel use	6.7	13.3	36.7	3.3	6.7	33.3

Most respondents considered poverty as being important since 86.7% of the respondents rated this factor between 3 and 5. This suggests that a large number of respondents understand the importance of this factor, which can be attributed to the high levels of poverty in South Africa (34.9% of the population), as noted by Nomafu et al. (2023). This is also in alignment with the perceptions of Hale et al. (2019), which refers to Maslow's hierarchy of needs and the importance of fulfilling basic needs before an individual can focus on the betterment of society. This also aligns with the sentiments of Riccardini et al. (2023), who highlight that critical global environmental problems were the result of vast poverty. One respondent indicated that they did not consider poverty an area of concern. This could indicate that some of the population at the CIPLA Medpro Manufacturing Logistics Department have not been affected by poverty. This perception goes against Courtnell (2019), who indicates that poverty is a critical element impacting a country's population. One respondent also indicated that they do not know. This could be a lack of education but also an area of concern in a country with high poverty levels.

A significant proportion of logistics staff (73.3%) at CIPLA Medpro Manufacturing identified that they consider traffic congestion moderately to very important (rating between 4 and 5).

This is aligned with Singh et al. (2023), who highlight that the automotive industry contributes to pollution. Rosenberg (2021) also supports this finding by stating that high levels of traffic can impact a population. It is also important to note that CIPLA Medpro Manufacturing is located in a high-traffic area of KwaZulu-Natal known as Mobeni. Therefore, the exposure of respondents could also be reflective of the results. Two respondents identified traffic congestion as mildly important, and one respondent indicated that did not know the impact. Although these numbers are small, it is an area of concern as traffic congestion is a visible contributor to environmental degradation. More importantly, logistics is highly involved with the transportation of goods, as noted by Rosano et al. (2022), which would mean that respondents deal with the effects of traffic congestion regularly.

Land pollution was considered as being important by 70% of the respondents (rating of 4 and above). This aligns with assertions by the Association for Water and Rural Development (2019), Adeleke et al. (2021) and Shah et al. (2021) that land pollution is an area of concern for developing countries such as South Africa. Land pollution is also one of the most noticeable types of pollution, according to Jin et al. (2018), therefore, the high level of concern is reasonable. The key informant states that CIPLA also practices recycling by means of recycling stations, which would increase awareness of land pollution. This is in accordance with results as 93.3% of the respondents rated land pollution to be a moderate to high-level concern for the organisation (rating of 3 and above). This can also be aligned with the sentiments of Bose et al. (2023), who indicate that the involvement of an organisation with green packaging increases awareness of the impacts of land pollution. It is important to note that CIPLA's initiatives may have a relation to employee perception of land pollution, as the key informant indicated that CIPLA Medpro Manufacturing has recycle bins situated within the manufacturing plant and administration areas. This could raise the level of awareness as respondents are continuously reminded to dispose of their waste correctly.

Water pollution was identified as being moderately important to very important by 80% of the respondents (rating 3-5). This is a positive response rate and reinforces Hasan et al.'s (2019) assertion that water pollution is a key area of concern for both humans and the environment. Respondents' responses are also supported by Denchak (2018), who identifies that water pollution has major impacts on both the environment and human well-being through incidents of chemical exposure to waterways, which can be due to poor disposal of pharmaceutical products. As an employee within the pharmaceutical sector, these issues should always be prioritised as they should be aware of the negative impacts of pharmaceutical products and by-products on water systems, which is likely to be the motivation behind respondents' responses. Ten percent of the respondents stated that they did not know. This is greatly concerning as there have been several incidents of large-scale water pollution in South Africa, however, respondents are still unaware of its presence. According to 10% of the respondents, water pollution is only of slight importance, whilst another 10% stated that they did not know the impact. This is also concerning as it indicates that 20% of the respondents are not aware of the severity of water pollution from the pharmaceutical sector on the environment and human health, as noted by Babuji et al. (2023) and Kordbacheh and Heidari (2023).

Air pollution was considered important (rated between 4 and 5) by 40% of the respondents, which is aligned with research by Olutola and Wichmann (2020), who state that air pollution is a serious concern for South Africans. Over one-third of the respondents indicated that air pollution is moderately important, which indicates that respondents are beginning to understand the impact of air pollution, which correlates with Ngobeni and Kekana (2023), who state that South Africans are becoming more aware of air pollution. Ten percent of the respondents stated that they did not know and 13.3% identified air pollution as not being a serious concern (rating of 2 or below). It is evident that at least 23.3% of the Logistics Department staff at CIPLA do not understand the impact of air pollution on society and ecosystems, giving rise to the perception that further education on the impacts of air pollution is required for staff members. This is further emphasised by Udeagha and Breitenbach (2023), who state that a lack of knowledge on air pollution can lead to threats such as an increase in respiratory diseases and habitat destruction going unnoticed. Air pollution has also been on the increase in South Africa, according to Udeagha and Breitenbach (2023).

Extreme weather conditions were considered as being very important (26.7%) and important (20%) by close to half of the respondents. Sixty percent of the respondents identified weather conditions as a concern (rating 3-5). This is aligned with the assertions by Denchak and Turrentine (2021), who state that weather changes directly impact the environment and humanity. Responses also corroborate Giddy's assertion (2019) that several extreme weather cases have occurred in South Africa since 2018. Twenty percent of the respondents did not perceive it as an important concern and the remaining 20% did not know what is meant by extreme weather conditions. This goes against Qin et al. (2023), who state that extreme weather conditions impact supply chains, which directly impact the availability of goods and services;

a potential reason for respondents not identifying this as an important issue is that extreme weather conditions were not a major issue in KwaZulu-Natal at the time of the survey. Subsequently, the extreme weather conditions that have been occurring since 2020 may have changed respondents' perceptions.

The depletion of the ozone was considered as being moderately important to very important as 76.7% of CIPLA Medpro Manufacturing logistics employees identified this in their responses (rated 3 and above). This shows that the majority of CIPLA Medpro Manufacturing staff understand that ozone depletion directly affects environmental concerns such as climate change. This aligns with the assertions by Dietz et al. (2020) and Malhi et al. (2020) that suggest that climate change is greatly important globally as it affects all countries and has been felt globally. This is also tied to the changing weather patterns, increased droughts and heatwaves identified by Denchak and Turrentine (2021) and Qin et al. (2023) as a result of ozone degradation and climate change. South Africa has also been directly affected by this as a number of natural disasters have occurred in the past five years, such as heavy flooding in KwaZulu-Natal in 2019 that damaged infrastructure and caused loss of life. In 2021, harsh droughts in the Northern Cape, Eastern Cape and Western Cape were identified as the worst in the past 100 years, which led to the government declaring a state of disaster (Sgqolana, 2021). Of concern is that 20% of the respondents stated that they did not know because the pharmaceutical industry contributes to ozone depletion, as noted by Bartolo et al. (2021). This identifies that CIPLA Medpro Manufacturing staff require training on the impact of this occurrence. Furthermore, one respondent identified they do not believe that is an area of concern. According to Routt (2021), climate change, which is a consequence of factors such as ozone depletion, will ultimately affect both society and businesses and, therefore, is a relevant reality for CIPLA Medpro Manufacturing and its employees.

The impact of hazardous waste was evenly split between moderate importance (33.3%) and high importance (33.3%). This is a plausible perception in an industry such as the pharmaceutical industry that produces large amounts of hazardous waste, as noted by Mishra et al. (2019). The majority of the respondents (76.7%) consider hazardous waste to be an area of concern (rated 3 and above), which corroborates the information provided by the key informant, who states that CIPLA focuses on the safe disposal of hazardous waste. However, it should be noted that 13.3% of the respondents indicated that they did not know. According to Fetta et al. (2023) and Sapkota and Pariatamby (2023), the impact of hazardous waste from industries such as the pharmaceutical sector can cause extreme environmental and social damage. Therefore, it is of utmost importance that all of the individuals who work with these substances are aware of the risks that are associated with them. As indicated by the key informant, the methods of disposal of hazardous pharmaceutical waste used at CIPLA Medpro Manufacturing are sludging and incineration, which, according to Fetta et al. (2023) and Sapkota and Pariatamby (2023), is the most environmentally-friendly method to dispose of pharmaceutical waste. This suggests that CIPLA Medpro Manufacturing understands the impact of pharmaceutical waste on the environment.

Chopping down of trees and forests had an equal split between moderately important (23.3%) and important (23.3%), closely followed by very important (20%). This shows that 67.7% of the respondents identified deforestation as an area of concern (rated 3 and above), which is in line with the perceptions of Onyili et al. (2023), Orewere et al. (2022) and Shebitz et al. (2023) who identify deforestation as an area of concern. It is evident that most respondents are aware of the risks and impacts of deforestation. A few respondents (16.7%) stated that they did not know, and a further 16.7% (rating of 1 and 2) did not understand the threat that it brings. This could be attributed to a lack of knowledge or simply an indication that respondents did not prioritise the impacts of deforestation over other environmental issues.

The loss of wildlife was identified as being moderate to very important (90% rated 3 and above), which is a good indicator inferring that the logistics team strongly support the protection of wildlife in South Africa. This is aligned with research by Mangachena and Pickering (2023) that highlights the importance of wildlife preservation in South Africa. It is important to note that although 90% of the respondents consider wildlife preservation as important, only 43.4% rated the loss of wildlife as a 4 or 5. This suggests that a number of respondents are beginning to understand its importance but do not fully understand its impact on society and the economy, as noted by Bean et al. (2022). It is important to note that 6.7% of employees at CIPLA Medpro Manufacturing also identified the loss of wildlife as not being important, and 3.3% indicated that they did not know. This is an indicator that although the protection of wildlife is important to the majority of CIPLA Medpro Manufacturing logistics staff, not all respondents share this perception and there is scope to educate some staff on the importance of wildlife preservation, especially in a country like South Africa that relies on tourism, as noted by Mangachena and Pickering (2023).

Over half of the respondents (56.7%) stated that population explosion is an area of concern (rating 3-5). This aligns with assertions by Everson et al. (2023), who indicate that population explosions and growth negatively impact sustainability through elements such as increased carbon emissions, food production and energy consumption. This was also supported by a statement made by the key informant: “The greater the human population is, the more the pollution will be, and this causes climate change. Also, as the population increases, so does the need for living spaces for humans. This causes environmental destruction.” One third of respondents (30%) indicated that they did not know. It is still important for staff members to understand the impact of population explosion on resource depletion, as noted by Almulhim and Cobbinah (2023). Only 13.3% of staff members identified population explosion to be slightly important (rating of 2), which is an area of concern as there is a direct relation to population growth and social friction, negative health concerns, traffic congestion, pollution levels and depletion of resources, as stated by Rosenberg (2021).

The consumption of genetically modified crops was rated as important by 23.3% of the respondents (rating of 4 to 5). This is aligned with the sentiments of Ghimire et al. (2023) and Rock et al. (2023), which indicate that genetically modified foods are becoming more common in South Africa. Jasrotia et al. (2023) also highlighted that due to the growing population of the world at large, the adoption of genetically modified foods has become more evident which has potentially increased awareness. A third of the respondents identified genetically modified crops as moderately important (rating of 3), which shows that respondents are beginning to understand the impact of genetically modified foods. Close to a quarter of the respondents (30%) stated that they did not know, whilst 6.7% of the respondents identified that it was not important. This indicates that at least a third of the respondents are unaware of the impact of genetically modified crops. This does not align with the sentiments of Ghimire et al. (2023), Mohan (2023) and Rock et al. (2023), which indicate the importance of genetically modified foods in South Africa.

The impact of pesticides and herbicides was largely not known by 36.7% of the respondents, whilst others considered it as not important (30% rated between 1 to 2). As a country that focuses on agriculture, the use of these substances has harsh impacts on both human health and the environment, according to Pazikowska-Sapota et al. (2020). This is an area of concern as it shows that 66.7% (rating of 1, 2 or don’t know) of the respondents are not aware of the significant risk that pesticides and herbicides have on human health, as noted by Raza et al.

(2019). The lack of knowledge on this factor is alarming and it should be addressed through the use of training programmes with CIPLA Medpro Manufacturing staff. Over a fifth (23.3%) of staff identified the use of pesticides and herbicides to be important (rating between 4 to 5), which is in line with that of Pazikowska-Sapota et al. (2020) and Raza et al. (2019), who note that this is critical to human health.

Over half of the respondents (53.3%) identified that poor farming practices are an area of concern (ratings 3 to 5). This indicates that over half the population of CIPLA Medpro Manufacturing logistics employees recognise the impact of poor farming practices, which is aligned with the insights of Stange et al. (2021), who state that poor farming practices threaten both human and environmental systems. More than one fifth (23.3%) of the respondents indicated that they do not know what is meant by poor farming practices, indicating that a number of respondents are unaware of the impact of poor farming practices, which are critical to the well-being of communities, as noted by Jin et al. (2018). Over a fifth (23.3%) of the respondents indicated that poor farming practices are not that important (rating 1-2), which is reflective of the perception that many respondents are not exposed to poor farming practices and, as such, they do not have knowledge on its impact on their lives.

Half of the respondents considered nuclear power to not be an important factor (rated 2 or 1) affecting them. This is an explicable result as it is not a prevalent concern in South Africa, where the primary source of energy is fossil fuels. A further 26.7% of the respondents stated that they did not know, which may relate to their lack of exposure to concepts of nuclear power, which is not common in South Africa. This could be a result of exposure to information on the impacts and effects caused by nuclear power. Only 23.3% of the respondents indicated that nuclear power is important to some degree (rated 3 and above). These responses are aligned with those of Abdullah et al. (2023) and Kivi (2018), who state that nuclear energy poses serious concerns to the environment and human health globally and should be closely monitored by all countries due to the expansive nature of the negative impacts of this type of energy.

The use of fossil fuels was rated as moderately important by 36.7% of the respondents, however, 33.3% of the respondents stated that they did not know. Fossil fuels contribute to climate change, according to Majeed et al. (2023). This is concerning as the burning and extraction of fossil fuels are identified as a barrier to sustainable development by Denchak

(2018), Gunjyal et al. (2023) and Rahman and Thurston (2020). Gunjyal et al. (2023) further state that burning fossil fuels increases habitat destruction, water pollution and air pollution. If 33.3% of the respondents are unaware of what fossil fuels are, decisions such as the choice of low-carbon emission vehicles would not be an option that they are likely to consider. This motivates the lack of the use of low-carbon emission vehicles that had been identified during the key informant interview. The lack of knowledge and importance given to fossil fuels should be addressed by CIPLA as it would hinder the adoption of clean energy by the organisation. Only 10% of respondents consider fossil fuels to be important (rating of 4 to 5), which suggests that many respondents are unaware of the impact of the burning of fossil fuels and the importance of changing over to clean energy or reducing the consumption of this harmful method of energy generation. According to Xie et al. (2020), a lack of awareness is concerning, as burning fossil fuels is a key contributor to climate change.

Overall, the most important environmental issues impacting respondents (rating of 5) were poverty (63.3%), land pollution (43.3%), hazardous waste (33.3%), traffic congestion (33.3%), water pollution (33.3%) and air pollution (33.3%). The survey responses are similar to those of Hale et al. (2019) and Hopper (2020), who discuss Maslow's hierarchy of needs and highlight the importance of health and safety prior to the enrichment of society and the environment. The results depicted are also closely related to the core areas of concern in South Africa, which is supported by Mangachena and Pickering (2023), Olutola and Wichmann (2020) and Sgqolana (2021). The least important environmental issues impacting respondents (rating of 1) were nuclear power (36.7%) and pesticides and herbicides (20%), with deforestation (6.7%), use of fossil fuel (6.7%), genetically modified crops (6.7%), loss of wildlife (6.7%) and poor farming practices (6.7%). Respondents' responses are aligned with the assertions of Kivi (2018), Pazikowska-Sapota et al. (2020), Rani (2021), Raza et al. (2020) and Stange et al. (2021), but also raise areas of concern on the lack of knowledge of the impacts that the identified factors have on society and the environment. The least understood impacts (don't know) were that of pesticides and herbicides (30%), genetically modified crops (26.7%), population explosion (23.3%) and nuclear power (23.3%). The lack of knowledge by respondents provides critical insight into areas of development for staff working at CIPLA Medpro Manufacturing. It is important to note that these areas of development are important to understand in a personal capacity but are not directly aligned with processes conducted by CIPLA Medpro Manufacturing. The results also reflect that the majority of responses were rated as 3. This suggests that respondents are beginning to understand the importance of environmental issues but have not yet understood each environmental issue to rate it as 4 or 5.

Figure 5.2 reflects the results of a question that was posed in the survey to determine if respondents felt that climate change would impact Cipla Medpro Manufacturing. If respondents indicated that it would impact the organisation, they were requested to identify how it would impact the organisation, which is reflected in Figure 5.3. Respondents were also given the choice of indicating that they did not know the impact. The purpose of this question was to determine whether respondents were aware of one of the core drivers of sustainable initiatives, which is climate change, as noted by Nguyen et al. (2023).

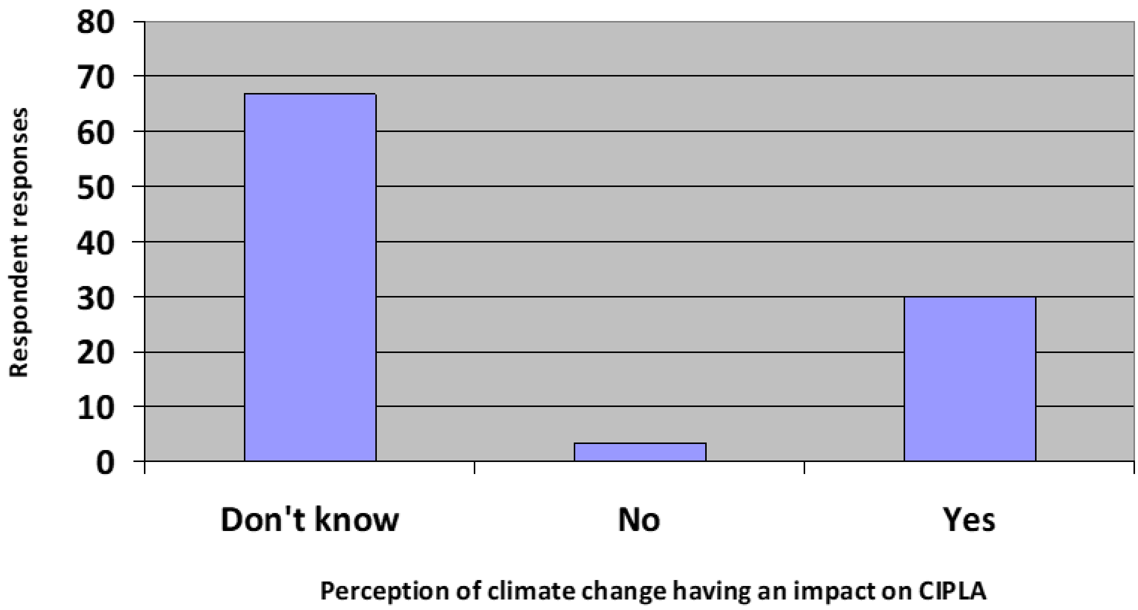


Figure 5.2: Respondents' perception of climate change having an impact on CIPLA (n=30, in %)

A third of the respondents (66.7%) did not know if climate change would impact CIPLA South Africa. This is concerning as it indicates that the majority of logistics staff at CIPLA Medpro Manufacturing do not understand the impact of climate change on business, which is of critical importance, as noted by Hervani et al. (2022) and Sindhwani et al. (2023) as it directly impacts the pharmaceutical industry through the increased burden of disease and supply chain disruptions. This indicates that business will be severely impacted, especially the pharmaceutical industry. This is also a cause for concern, as Shashi (2022) indicates that the pharmaceutical industry is also a significant contributor to climate change. Thirty percent of the respondents stated that climate change would have an impact on CIPLA South Africa, which aligns with the assertions of Hervani et al. (2022), Qin et al. (2023), Routt (2021) and Sindhwani et al. (2023) who indicate that climate change will adversely impact business and profitability. One respondent (3.3%) felt that climate change would have no impact on business. This goes against the insights of Dietz et al. (2020), Malhi et al. (2020), Qin et al. (2023) and Routt (2021), who identified that climate change will directly impact life on Earth, causing disruptions in supply and demand patterns as well as habitat destruction causing shortages of raw materials. Only 30% of the Logistics Department at CIPLA Medpro Manufacturing had an understanding of the impact of climate change on CIPLA Medpro Manufacturing. This is concerning as it indicates that 70% of staff in the Logistics Department are unaware of the risks that the business will face due to climate change, which directly relates to the risk identification theory as noted by Bommasani et al. (2021), Buganova et al. (2021) and Joshi (2023). This is also noted in a statement by the key informant, who acknowledges the lack of understanding by stating:

> Climate change should be considered the number one challenge, as it affects the entire world. The benefits of adhering to good environmental practices are to create a safer environment and possible cost savings. Currently, the perspective with regard to environmental sustainability is negative, as companies and individuals do not understand how important it is. If they did, they would place greater importance on environmentally-friendly practices.

As noted earlier, Figure 5.3 highlights the respondents’ responses as to how they think climate change will impact CIPLA Medpro Manufacturing. Of the nine respondents (30%) who identified that climate change would impact CIPLA Medpro Manufacturing, only seven (23.3%) provided a response as to what the impact would be, which indicates that two respondents did not provide any motivation for their answer. The purpose of probing further into the respondent's insights was to identify the validity of responses by determining if the respondents actually understood the impact. Responses were grouped thematically based on themes identified in the literature and arranged from highest to lowest frequency of responses.

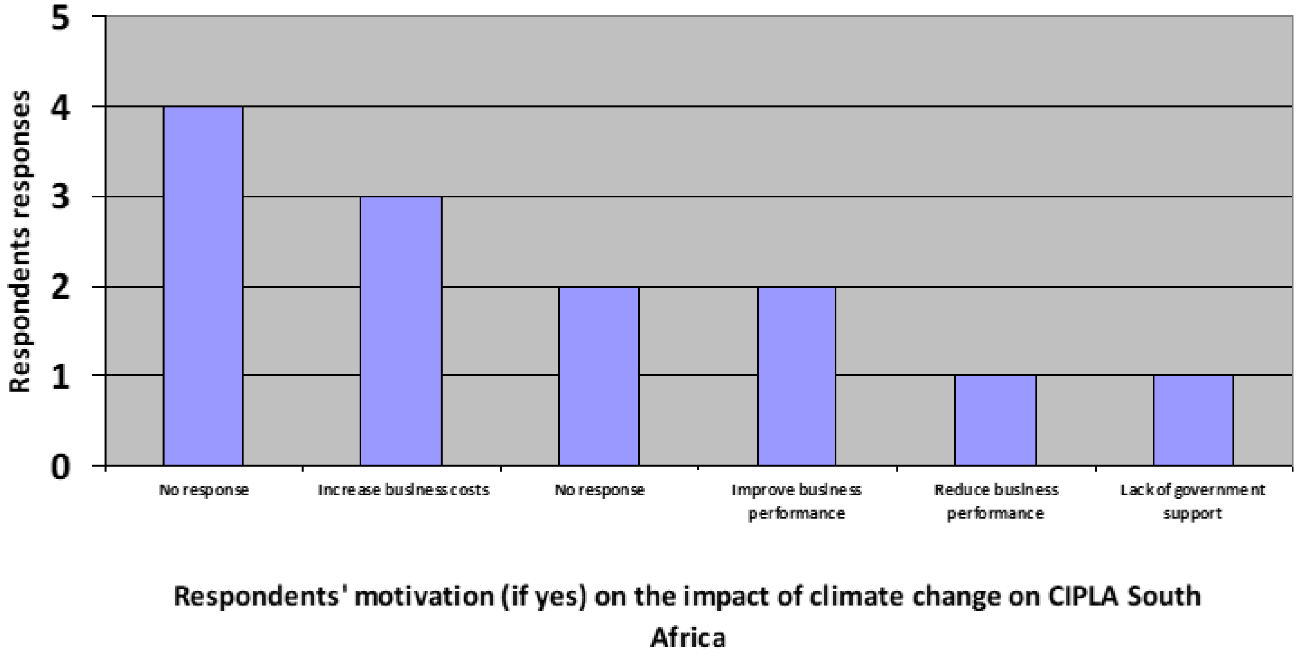


Figure 5.3: Respondents' motivation (if yes) on the impact of climate change on CIPLA South Africa (n=9)

Three respondents indicated that climate change would increase business costs, which is aligned with the assertions of Bauer and Rudebusch (2023), who indicate that climate change increases business costs through supply chain destruction, damage to infrastructure and shortages of raw materials. Two respondents also indicated that it improved business performance, which goes against the assertions of Bauer and Hervani et al. (2022) and Routt (2021), Rudebusch (2023) and Sindhwani et al. (2023), who indicate that climate change negatively impacts business performance. This could suggest that these respondents are actually not knowledgeable of the impact of climate change on the organisation. One respondent indicated that it would reduce business performance, which is aligned with the perceptions of Bauer and Hervani et al. (2022) and Routt (2021), Rudebusch (2023) and Sindhwani et al. (2023), who state that climate change negatively impacts business performance through a reduction in supply chain performance, shortages in raw materials and damage to infrastructure. A lack of government support was identified as a possible impact of climate change by one respondent. This assumption does not directly relate to climate change, as noted by the insights of Routt (2021) and Sindhwani et al. (2023), which leads to the perception that the respondent does not fully understand the concept of climate change.

These responses are an area of concern as they indicate that of the nine respondents who identified that climate change would impact CIPLA Medpro Manufacturing, only four showed evidence that they understood how it would impact the organisation. This could also impact the motivation of employees to adopt green logistics initiatives, as Nguyen et al. (2023) note that climate change acts as a driver of sustainable initiatives.

Table 5.6 highlights the impact that various factors have on climate change to determine respondent's awareness of the key contributors to climate change. Respondents were given the option to choose between (1) no impact, (2) little impact and (3) significant impact. Respondents were required to provide a response for each factor, however, some respondents did not respond to the question, which promoted the addition of another column to indicate how many respondents did not respond to each factor. Factors were arranged from highest to lowest based on their significance as contributors to climate change. The question also required the respondents to motivate their answer but there was no additional space provided, which was an oversight by the researcher.

Table 5.6: Causes of climate change according to respondents' perception (n=30, in %)

Issues	No response	No impact	Little impact	Significant impact
Emissions from industry/ factories	-	3.3	13.3	83.3
Deforestation (cutting of trees/ forests)	3.3	3.3	13.3	80
Emissions from vehicles (cars, trucks, buses)	-	3.3	16.7	80
Increase in human population and consumption	3.3	6.7	16.7	73.3
Ozone layer depletion from chlorofluorocarbons (gases from refrigerants, cleaning solvents, and aerosol propellants)	6.7	13.3	20	60
Waste disposal	6.7	3.3	30	60
Energy generation from fossil fuels (coal, oil, gas)	-	6.7	40	53.3
Nuclear testing	-	30	30	40

Respondents were asked to identify the causes of climate change. Table 5.6 shows the respondents’ responses, and results have been arranged from highest to lowest based on significant impact. As seen in Table 5.6, the majority of the respondents identified the following issues to have a significant impact on climate change: emissions from industry and factories (83.3%), deforestation (80%), emissions from vehicles (80%), an increase in human population (73.3%), depletion of the ozone layer (60%), and waste disposal (60%). Respondents' responses are validated by Deb (2019), Denchak (2018), Kim (2021), Rosenberg (2021) and Sharma et al. (2021), who highlight the negative impacts of the above-mentioned factors on climate change.

The impact of energy generation from fossil fuels and nuclear testing on climate change received mixed responses, with 53.3% and 40% of the respondents considering these issues to have a significant impact, respectively. On the other hand, around 46.7% and 60% of the respondents considered energy generation from fossil fuels and nuclear testing to have little to no impact on climate change, respectively, which goes against the assertions of Donaghy (2021), Kabir et al. (2023), Majeed et al. (2023), Plantinga and Scholtens (2021) and Rahman and Thurston (2020) who show that there is a direct link between the burning of fossil fuels and climate change. This is a concerning statistic as logistics and transportation directly contribute to the burning of fossil fuels, as identified by Agyabeng-Mensah (2020), and this would suggest that the Logistics Department does not understand their impact on climate change. El-Said (2020) and Kivi (2018) identified that nuclear testing directly impacts climate change. This is challenged by Carter and Pradipta (2020), who argue that there is a lack of evidence to determine that nuclear testing has a significant impact on climate change. Kivi (2018) further adds that presuming that the entire process of nuclear testing is taken into consideration, including the extraction of uranium, the impact on climate change is evident. With 60% of the respondents stating that nuclear testing has little to no impact on climate change, it may allude to a lack of understanding of nuclear testing, which is not surprising considering that South Africa is not actively involved in nuclear testing and there is not much social media awareness of the impact of nuclear testing on climate change in South Africa.

This indicates that while there is a high level of awareness amongst logistics staff members at CIPLA Medpro Manufacturing on factors impacting climate change, some employees do not understand climate change or, alternatively, the impact of supply chain processes on the external environment. According to Mashala (2018), awareness is a key driver of employee involvement in sustainable initiatives. Neirotti (2020) indicates that employee involvement is critical to the successful implementation and maintenance of sustainable initiatives within an organisation. Therefore, based on the above results, employees at CIPLA Medpro Manufacturing are likely to support GSCM and green logistics initiatives.

Table 5.7 indicates respondent's opinions on the meaning of the concept of green logistics, which is a question that was posed in the survey and required respondents to define the concept. Respondent's answers were grouped thematically, according to the interpretation of responses. Themes and concepts discussed in the literature review were used to categorise responses. Responses were arranged from the highest to lowest based on the number of responses in each category.

Table 5.7: Respondents' opinion on the definition of green logistics (n=30)

	Frequency	**%**
Don't know	13	43.3
Improving the environmental performance of the organisation through the Logistics Department	6	20
No response	5	16.7
Sustainable policies and practices	1	3.3
Improving environmental performance	1	3.3
Waste reduction	1	3.3
Corporate social responsibility	1	3.3
Damage was done to the environment	1	3.3
Recycling	1	3.3

An overwhelming response is that 43.3% of logistics staff members at CIPLA Medpro Manufacturing do not know what is meant by green logistics. This is very concerning, considering it is imperative to sustainable development, as noted by Nikseresht et al. (2023), Shu et al. (2023) and Wang et al. (2018). Another concern is that even though, as identified by the key informant, CIPLA Medpro Manufacturing is involved in green logistics activities, the logistics team, who are the implementors of green logistics initiatives, do not understand the concept. This ties back to the stakeholder theory that highlights the importance of stakeholder awareness and knowledge management, as noted by Ali et al. (2023), Brogi et al. (2022), Maskrey et al. (2023), Rodríguez-Espíndola et al. (2022) and Zouari-Hadiji (2023).

Only 20% of the respondents' responses were accurate on the definition of green logistics. This is a huge concern as CIPLA Medpro Manufacturing is involved in a number of green logistics initiatives, but 80% of the logistics team at CIPLA Medpro Manufacturing does not understand the definition of green logistics. This could have a direct impact on the performance of green logistics initiatives based on the internal stakeholder theory, as noted by Brogi et al. (2022). Even though the organisation focuses on green logistics initiatives, it can be identified that most of the Logistics Departments at CIPLA Medpro Manufacturing do not understand the concept, which impacts the success of the implementation and adoption of GSCM initiatives, according to Rodríguez-Espíndola et al. (2022). According to Maskrey et al. (2023) and Zouari-Hadiji (2023), the awareness of stakeholders and employees also directly impacts the theory of risk identification, which states that if employees are not knowledgeable about the operations of a business, it will be difficult for them to pick up potential risks. This directly impacts the success rate of initiatives such as GSCM, according to Maskrey et al. (2023) and Zouari-Hadiji (2023). Five of the respondents (16.7%) left this question blank, which is perceived as a lack of knowledge, as this has not been the trend in previous questions. This adds to the interpretation that most logistics staff members at CIPLA Medpro Manufacturing do not understand the concept of green logistics, which is a critical area of concern, as noted by Brogi et al. (2022) and Rodríguez-Espíndola et al. (2022).

One respondent identified that it was linked to sustainable practices and policies that align with insights by Wang et al. (2020), who agree that green logistics involves various practices by an organisation that are aligned with sustainable efforts. Another respondent stated that it involved improving environmental performance, which correlates to the insights of Nikseresht et al. (2023), Shu et al. (2023) and Wang et al. (2020), who indicate that green logistics is aimed at reducing the environmental impact of operations and processes. One respondent highlighted waste reduction as a possible definition of green logistics, which is aligned with the insights of Alves (2019), who indicates that green logistics is used to minimise ecological impact. According to Nikseresht et al. (2023), Rodrigue et al. (2017) and Wang et al. (2020), waste reduction is one of the aims of green logistics, however, it is not the definition of green logistics. Another respondent identified green logistics as being corporate social responsibility, which aligns with the perceptions of Epstein et al. (2018), who identify green practices as being an element of sustainable development. However, this does not align with the assertions of Wang et al. (2018), who assert that it is aimed at improving environmental performance and reducing costs that relate to Sustainable Development Goals rather than corporate social responsibility. One respondent stated that green logistics indicates that damage was done to the environment. This aligns with the assertions of Alves (2019) and Nureen et al. (2023) that show that green logistics has been developed to facilitate sustainable development, which is used as a method to reduce environmental degradation; it does not identify green logistics as damage to the environment. This suggests that the respondent does not know the meaning of green logistics. One respondent identified green logistics as recycling. Although it is a practice used in the Logistics Department to improve environmental performance, it does not define green logistics. It is assumed that the respondent relates green logistics to the practices conducted in the Logistics Department to 'green' operations, as recycling was identified by the key informant as an initiative conducted at CIPLA Medpro Manufacturing.

Table 5.8 highlights respondents' opinions on the meaning of GSCM to determine if they are familiar with the concept. This question was used as a follow-up to the previous question, which focused on respondent's opinions of the concept of green logistics, which is depicted in Table 5.7, to determine which concept respondents were more aware of as green logistics is a developing concept, whilst GSCM has a more prominent concept used in the 'greening' of supply chains, as noted by Abdel-Baset et al. (2019) and Islam et al. (2023). Respondent's answers were grouped thematically, according to the interpretation of responses. Themes and concepts discussed in the literature review were used to categorise responses. Responses were arranged from the highest to lowest based on the number of responses in each category

Table 5.8: Respondents' opinions on the concept of GSCM (n=30)

Opinion	**Frequency**	**%**
Don't know	13	43.3
Environmentally-friendly supply chains	7	23.3
No response	4	13.3
Environmentally-friendly production	1	3.3
Environmentally-friendly products	1	3.3
Managing business sustainably	1	3.3
Minimising the environmental impact of the supply chain	1	3.3
Recycling	1	3.3
Sourcing responsibly	1	3.3

Almost half of the respondents (43.3%) indicated that they did not know the meaning of GSCM. This is similar to the respondents' responses to green logistics in Table 5.5. This indicates that these respondents do not have an understanding of sustainable initiatives within the supply chain. This ties back to the concern that the logistics team at CIPLA Medpro Manufacturing, although involved with GSCM initiatives, do not understand the concept of practices that they conduct. According to Govindan et al. (2017), this can adversely impact green initiatives and can even be identified as a barrier to the adoption of green logistics initiatives. This is also an area of concern as logistics staff members are charged with the implementation of these initiatives and, if they are not knowledgeable, it can impact the implementation of this initiative, as noted by Martínez-Peláez et al. (2023). This question was also left blank by 13.3% of the respondents, which could be the result of either a lack of knowledge or simply a lack of interest by these respondents. This is concerning as it indicates either a disinterest or a lack of knowledge of GSCM by CIPLA Medpro Manufacturing logistics staff. Both of these results are an area of concern as they directly impact the risk identification theory and internal stakeholder theories, which directly influence the success rate of GSCM initiatives, as noted by Ali et al. (2023), Brogi et al. (2022), Maskrey et al. (2023), Rodríguez-Espíndola et al. (2022) and Zouari-Hadiji (2023).

More than a fifth of the respondents (23.3%) stated that GSCM is involved with environmentally-friendly supply chains, which correlates with the sentiments of Herbon and Tsadikovich (2023), Khan (2018), Ojijo (2023) and Zaid et al. (2018) who identify that GSCM is indeed the adoption of green practices within a supply chain to improve environmental performance. One respondent indicated that it involved environmentally-friendly production, which aligns with assertions by Ojijo (2023) and Zaid et al. (2018), indicating that it is one of the key purposes of GSCM. Environmentally-friendly products were identified as a possible definition of GSCM, which is the end product of GSCM initiatives, according to Zaid et al. (2018). Although this is not completely correct, it does feed into the greater purpose of GSCM, which suggests that the respondent is beginning to understand the concept of GSCM. One respondent indicated that it involves managing businesses sustainably, which is aligned with assertions by Khan (2018) and Ojijo (2023), and suggests that GSCM focuses on incorporating sustainable practices into business operations. Minimising the environmental impact of the supply chain was identified by one respondent as a possible definition of GSCM. This aligns with the sentiments of Srivastava (2022) who identifies that GSCM is aimed at the reduction of carbon emissions and minimising waste. However, Khan (2018) states that it is focused on the addition of value, which in turn improves environmental performance. One respondent identified GSCM as recycling, which does not describe the GSCM as an initiative but rather an element of this green practice. Pan et al. (2019) note that recycling is one of the key attributes of any green initiative, however, this is not substantial enough to define GSCM. As indicated by Khan (2018) and Ojijo (2023), GSCM involves a number of processes and practices throughout the supply chain and not just one element.

Sustainable sourcing was identified as another definition of GSCM, which only identifies one element of GSCM. Haiyun et al. (2021) assert that procurement is an element of GSCM but highlights that it also involves manufacturing, distribution, warehousing, and transportation. This emphasises that it involves a number of different processes and operations rather than just a singular process. It is evident that the logistics employees at CIPLA Medpro Manufacturing are not fully aware of the concept of GSCM even though they are involved with these operations on a daily basis. This is concerning since, according to Grijalvo and García-Wang (2023), Tseng et al. (2019) and Siripipatthanakul et al. (2023), GSCM and 'going green' is the only way forward for the world's economies as it ensures that sustainable development is achieved, which was also noted by the theory of green logistics, which was discussed in Chapter 2. As indicated by the above discussion, only 23.3% of the respondents have a clear understanding of GSCM and its purpose, 20% have some idea of the meaning of GSCM and 56.7% of the respondents do not have a sufficient understanding of this initiative.

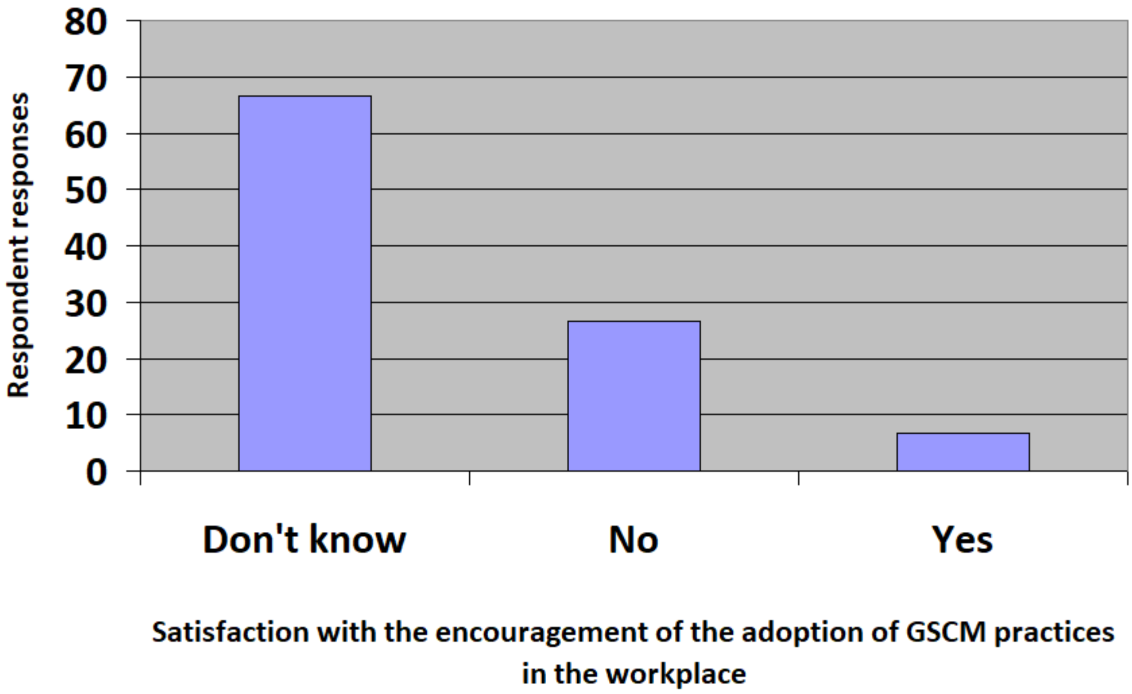


Figure 5.4: Respondents' satisfaction with the encouragement of the adoption of GSCM practices in the workplace (in South Africa specifically)

Two respondents (6.7%) identified that they believe that South Africa is currently doing enough to support the adoption of GSCM initiatives. This indicates that 93.3% of the respondents either do not believe that enough is being done in South Africa to encourage GSCM policies or that they do not know if enough is being done to support GSCM initiatives. A third of the respondents (66.7%) did not know if the country was doing enough to encourage the adoption of GSCM practices in the workplace. This can be related to insights from Table 5.7 and Table 5.8 that indicate that a number of respondents were unaware of the concept of GSCM and green logistics. This is a concerning finding as it indicates that the majority of the Logistics Department at CIPLA Medpro Manufacturing does not understand GSCM and they are required to support and implement this initiative. This also ties back to the internal stakeholder theory that indicates that internal stakeholders, such as employees, have a significant role in the implementation of business initiatives and a lack of awareness negatively impacts the performance of these initiatives, as noted by Brogi et al. (2022), Rahardja (2023) and Rodríguez-Espíndola et al. (2022). This also indicates that the respondents are unaware of government policies as the South African government has adopted a number of policies to support the transition toward sustainable development, as noted by The Department of Forestries, Fisheries and the Environment (2022). Over a quarter (26.7%) of the respondents indicated that not enough was being done in South Africa to encourage the adoption of GSCM initiatives, which correlates with the response of the key informant who highlighted the lack of auditing and drive towards GSCM initiatives by government policy.

Figure 5.5 explores the respondents' suggestions to improve the drive towards the adoption of GSCM initiatives in South Africa, if they perceived that not enough was being done to promote the initiative. Only respondents who stated that not enough was being done to encourage GSCM in South Africa were required to provide a motivation. Of the eight respondents (26.7%) who indicated that not enough was being done (as noted in Figure 5.3), six provided responses which were grouped thematically and arranged from highest to lowest based on the frequency of responses to each theme.

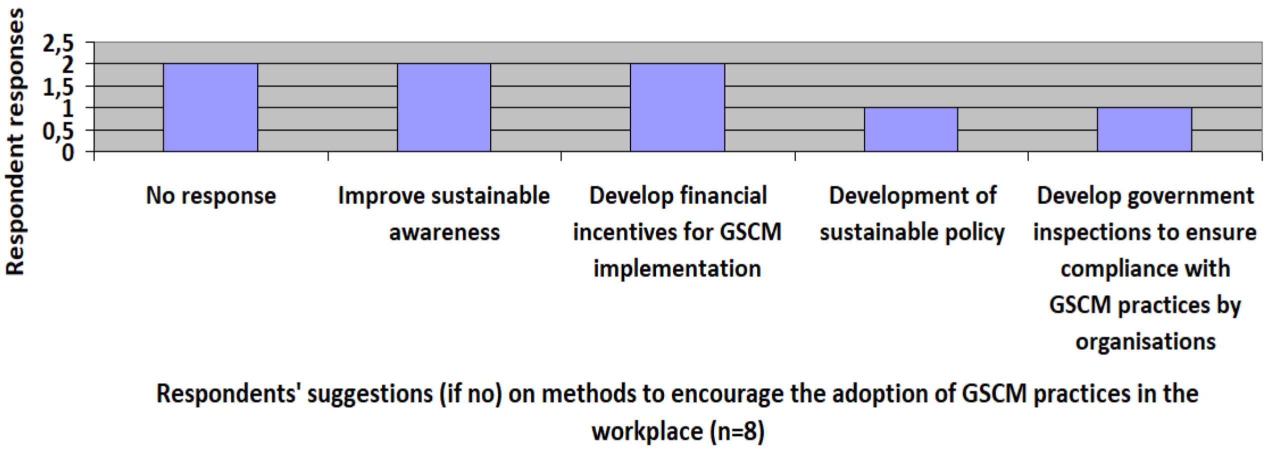


Figure 5.5: Respondents' suggestions (if no) on methods to encourage the adoption of GSCM practices in the workplace

Two respondents stated that there is not enough awareness of sustainability, which indicates that more could be done to promote this initiative. This ties back to the sustainable development theory, which highlights the importance of sustainable development in the improvement of the economic and environmental performance of a country, as noted by Chams and García-Blandón (2019) and Diab and Nasr (2023). Two respondents felt that there should be financial incentives in place to improve the adoption of GSCM initiatives by organisations. This goes against the assertions of the Department of Forestries, Fisheries and the Environment (2022) that highlight a number of ‘green taxes’ in place by the South African government to act as drivers to the adoption of GSCM initiatives by businesses. However, insights by Abdel-Baset et al. (2019) substantiate respondents' answers by stating that financial incentives would further promote the adoption of GSCM initiatives by businesses. One respondent identified that the government should develop a sustainable policy. This goes against assertions by the Department of Forestries, Fisheries and the Environment (2022), which suggests that there are a number of policies in place by the government to promote the adoption of green initiatives such as GSCM. The most common policies guiding the adoption of sustainable initiatives are the South Africa National Framework for Sustainable Development, the Ten-year Innovation Plan, the Industrial Policy Action Plan, the 2009 Framework Response to the International Economic Crisis and the New Growth Path (Department of Forestries, Fisheries and the Environment, 2022). This leads to the assumption that either the respondents lack knowledge of government policies or that respondents perceive that policies are insufficient, and further development of policies is required.

The key informant also identified that the South African Health Products Regulatory Authority should develop a more effective policy on the adoption of GSCM initiatives, which supports respondents' responses. This is an area of concern, according to Epstein et al. (2018), Sun et al. (2023) and Trevisan et al. (2023), as government policies fulfil a crucial role in the adoption of GSCM initiatives. One respondent stated that governments should implement inspections to ensure that GSCM initiatives are being adopted by organisations, which was a concern that was also highlighted by the key informant. This reflects the element of government control on policies, which is a crucial element in ensuring GSCM initiatives are adopted, according to Sun et al. (2023), Trevisan et al. (2023) and Ziolo and Ghoul (2019). This also suggests that even though government policies are important, the control of these policies is equally important in ensuring the successful adoption of GSCM initiatives by the industry.

Table 5.9 focused on respondents' perceptions as to whether businesses, non-profit organisations or government should be driving GSCM initiatives. The levels of government were also broken down into national, provincial and local. The question was aimed at determining, which entity was best placed to take the lead to promote GSCM as well as to determine which entities respondents perceived should be involved and which should not. Results were arranged from highest to lowest based on the number of responses indicating that the entity should take the lead. It is also important to note that respondents were not limited to one choice in each field and they could choose the same option for each entity.

Table 5.9: Respondents' perception of the best-placed entity for the promotion of GSCM practices within the industry (n=30, in %)

	Should take the lead	**Be involved but not take the lead**	**Not be involved**	**No answer**
National government	96.7	-	-	3.3
Business and industry	50	33.3	3.3	13.3
Provincial government	46.7	30	3.3	20
Local government	23.3	50	6.7	20
Non-governmental organisations	23.3	40	20	16.7

Almost all respondents (96.7%) indicated that the national government should take the lead in promoting GSCM initiatives, which is aligned with the sentiments of Veitch (2020) and Zighan et al. (2023), who state that the pharmaceutical industry is highly regulated by the national government. This also correlates with Kim et al. (2023) who state that regulations are a necessity within the pharmaceutical sector and are reflective of respondents’ position as they work within the pharmaceutical industry and most likely understand the importance of government regulations. Based on respondents’ responses, it is evident that they perceive that the national government should be driving GSCM, which is also aligned with Ziolo and Ghoul (2019), who state that government regulations are a critical driver for the adoption of GSCM initiatives. This is also aligned with the key informant who indicated that government and governing bodies need to implement better policies to promote GSCM initiatives. One respondent did not respond to this question, this is a relatively small number and indicates that this respondent most likely did not have a good understanding of the impact of the national government on GSCM.

Half of the respondents stated that businesses and industry should take the lead. This suggests that half of the logistics team at CIPLA Medpro Manufacturing believes that the business has to take the lead in the implementation of GSCM initiatives, which is aligned with the sentiments of Agyabeng-Mensah (2020), Mughal et al. (2023) and Rakhmangulov et al. (2017) who highlight the prominent role that businesses play in driving GSCM initiatives. This is also aligned with the insights of Pan et al. (2019), who agree that businesses fulfil a crucial role in a circular economy, and the adoption of sustainable practices by industry is paramount to change from a linear to a circular economy. A third of the respondents (33.3%) indicated that businesses should be involved but not take the lead. This is concerning as it indicates that it should not be the duty of the industry to promote GSCM even though businesses are the implementors of this initiative, according to Tseng et al. (2019). One respondent indicated that businesses should not be involved in promoting GSCM initiatives, which indicates that the respondent does not have a strong understanding of the concept as businesses are the implementors of these initiatives. Some respondents (13.3%) did not respond to this question, which is reflective of respondents’ responses in Table 5.5 that highlighted that a number of respondents do not fully understand the concept of GSCM.

According to 46.7% of the respondents, the provincial government should take the lead, which indicates that respondents also perceive that the promotion of GSCM initiatives should be micromanaged from a provincial level. This also aligns with the sentiments of Torres-Delgado et al. (2023), who identify that the provincial government plays a crucial role in the adoption of GSCM initiatives. Thirty percent of the respondents stated that the provincial government should be involved in promoting GSCM initiatives but not take the lead, which goes against the assertions of Wu (2023), who states that the provincial government is critical in driving compliance within the pharmaceutical sector. These responses correlate with previous ones that suggested that the national government should take the lead. One respondent identified that the provincial government should not be involved in promoting GSCM initiatives, which goes against the sentiments of Torres-Delgado et al. (2023), who indicate that the government should be involved in sustainable development at all levels. Twenty percent of the respondents did not respond to the question, which suggests that they do not understand the various levels of government or the role that they fulfil in complying with government regulations.

Over a fifth of the respondents (23.3%) identified that local government should take the lead in promoting the adoption of GSCM initiatives. This aligns with the assertions of Trevisan et al. (2023) who identify that local or municipal government is the most significant when it comes to ensuring environmental compliance by organisations. Half of the respondents identified that local government should be involved but not take the lead, this suggests that respondents perceive that the promotion of GSCM initiatives should be prioritised by higher levels of government, as indicated in previous responses. Two respondents indicated that local government should not be involved with the promotion of GSCM initiatives, which goes against the sentiments of Sun et al. (2023), who indicate that local government is a core element in the promotion of GSCM initiatives. Twenty percent of the respondents did not respond to this question, which emphasises the perception that some respondents do not understand the various levels of government as the same number of respondents did not respond to the previous question on provincial government.

Over a fifth of the respondents (23.3%) indicated that non-governmental organisations should take the lead in promoting GSCM initiatives, which suggests that the private sector should be the driver of this green initiative. This is aligned with the assertions of Sharma et al. (2021), who identify the importance of the private sector in the creation of a circular economy. Forty percent of the respondents indicated that non-government organisations should be involved but not take the lead. This highlights the perceptions of the logistics staff members at CIPLA Medpro Manufacturing in the previous questions and key informant interview, which indicated that the government was best situated to promote GSCM initiatives but businesses also fulfilled a key role in the adoption of these initiatives. Twenty percent of the respondents indicated that non-governmental organisations should not be involved with the promotion of GSCM initiatives. This is again aligned with responses by respondents indicating that the government should be the core promoter of GSCM initiatives. However, this goes against the insights of Blythe (2019), who identifies that both private and public sectors should be involved in promoting GSCM initiatives. Less than a fifth of the respondents (16.7%) did not respond to this question, suggesting that they most likely did not place significance on this potential driver of GSCM initiatives.

According to the responses, the national government should take the lead in promoting GSCM within the pharmaceutical industry. This is aligned with the assertions by Veitch (2020) and Zighan et al. (2023), who state that government intervention is critical in the adoption of sustainable initiatives. This also correlates with the claims of Ziolo and Ghoul (2019) that highlight the importance of government support for sustainable development through policies and regulations. However, respondents' responses oppose the assertions of Blythe (2019) that indicate that both the government and industry should be held equally accountable for the adoption of sustainable practices and a circular economy. A number of respondents do not understand the role that the local and provincial governments fulfil in promoting GSCM initiatives. An important theme identified is that the national government policy has a significant effect on the adoption of GSCM and green logistics initiatives within the pharmaceutical sector. This is supported by Asongu and Odhiambo (2019), Cavagnaro and Curiel (2017), and Ziolo and Ghoul (2019), who highlight that the link between government policy and the adoption of green initiatives is positive, therefore, it can be assumed that when the national government establishes sustainable policies, more organisations adopt green initiatives. This suggests that national government policies are crucial to driving GSCM and green logistics policies within the pharmaceutical sector in South Africa.

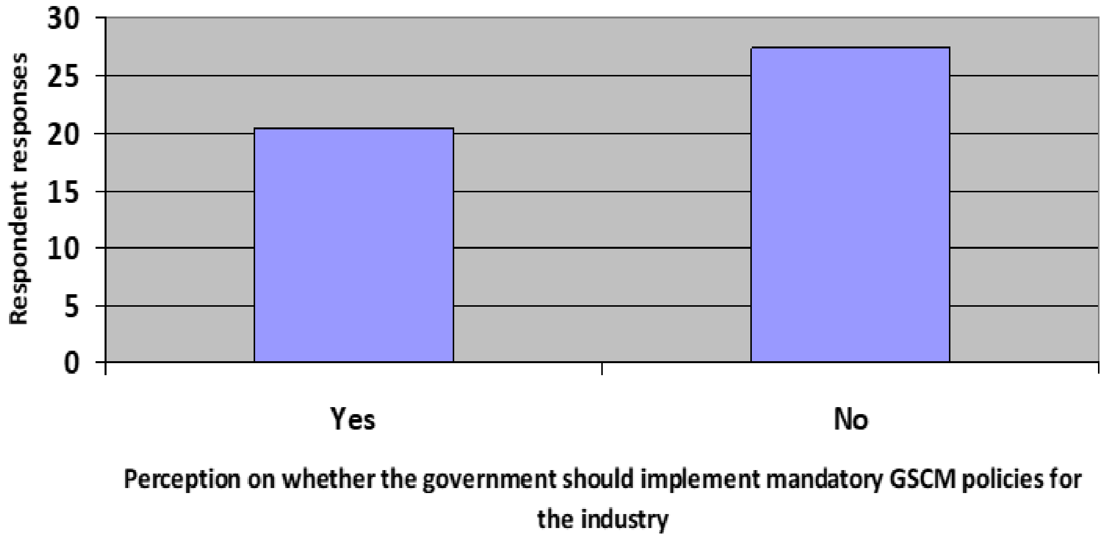


Figure 5.6: Respondent's views on whether a mandatory policy should be implemented by the government to promote GSCM policies within the industry

According to respondent responses depicted in Figure 5.6, the majority of the respondents do not perceive that the government should implement mandatory GSCM policies for industry. This question was posed to determine if respondents perceived that mandatory regulation would be the best way to drive sustainability within the supply chains of industries. Respondents were required to provide a motivation for their response, which is further discussed in Table 5.10.

Two-thirds of the respondents (66.7%) identified that the government should implement mandatory GSCM policies, which is a good indication that most logistics employees at CIPLA Medpro Manufacturing support green initiatives and would like mandatory policy driving GSCM. This is aligned with the perception of Zighan et al. (2023), who assert that government policies are key contributors to the movement toward GSCM. This is also supported by Abdel-Baset et al. (2019), Hong et al. (2019), Sun et al. (2023), Veitch (2020) and Ziolo and Ghoul (2019). A third of the respondents (33.3%) identified that governments should not implement mandatory policies on GSCM. This goes against the views of Sun et al. (2023) and Zighan et al. (2023), who state that the government should be involved in driving the adoption of GSCM practices. It is important to note that CIPLA Medpro Manufacturing is a private organisation, and if policies are made mandatory, it limits an organisation's ability to use a number of techniques to improve its financial performance, as noted by Shamsuzzoha et al. (2020). A very interesting finding is that 96.7% of the respondents supported the national government taking the lead in promoting the adoption of GSCM initiatives (Table 5.10) but only 66.7% would like a mandatory policy to be implemented. This suggests that 30% of the respondents do not want mandatory policy even though they would like the national government to lead the promotion of GSCM initiatives. This suggests that they have a possible negative perception of the implementation of the mandatory policy. This is aligned with the sentiments of Epstein et al. (2018), which identifies that without a balance of the three pillars of sustainability, sustainable development cannot be achieved. This is aligned with the sentiments of Fischer et al. (2023) and Maciková et al. (2018), who highlight that a business' aim is to achieve a financial benefit and, therefore, financial performance is the core of most private organisations.

Table 5.10 indicates respondents' responses to the motivation behind their initial response to the question of whether the government should implement mandatory policy. Respondents were requested to provide a motivation irrespective of whether they agreed or disagreed that the government should make GSCM policies mandatory. It is important to note that only seven respondents provided a response and that all responses were only from those who agreed that GSCM policies should be made mandatory.

Table 5.10: Respondents' motivation for government implementation of mandatory GSCM policies (n=7)

Motivation	Frequency	Percent
To preserve the future of humankind	1	14.3
It directly impacts business	1	14.3
It directly impacts the government	1	14.3
Duty of everyone	1	14.3
The most effective way to ensure the adoption of GSCM	1	14.3
Government controls industry	1	14.3
The government can enforce GSCM practices	1	14.3

One respondent identified that the government should implement mandatory GSCM policies as it would preserve the future of humankind. This aligns with Keser (2023) and Wamsler (2020), who indicate that sustainable development initiatives are focused on ensuring the well-being of future generations. The direct impact on business was identified by one respondent as another motivating reason for the government to implement mandatory policy. This is similar to the assertions of Trevisan et al. (2023) and Ziolo and Ghoul (2019), who identified that government policies and taxes have a direct impact on businesses in both a financial and operational aspect. One respondent indicated that the implementation of mandatory policy on GSCM would also directly impact the government. This correlates to the sentiments of Zighan et al. (2023), which indicate that the implementation of GSCM initiatives would impact the environment and ensure that living conditions in countries and provinces are sustained. One respondent also identified that it is the duty of everyone as a motivating reason for the mandatory implementation of GSCM initiatives. This is aligned with the assertions of Kim (2021), Morseletto (2020) and Sharma et al. (2021), who argue that everyone is affected by the negative impacts of poor environmental performance and it should, therefore, be the duty of businesses, society and the government to create a circular economy through sustainable development initiatives such as GSCM. One respondent stated that it was the most effective method to ensure the adoption of GSCM initiatives. This aligns with the assertions of Khan and Ali (2022) and Kim et al. (2023), who indicate that governments are implementing Sustainable Development Goals in their constitutions and treaties. Another motivating factor for the mandatory implementation of GSCM initiatives was that the government controls the industry, which was highlighted by one respondent. This is aligned with the sentiments of Zighan et al. (2023) and Ziolo and Ghoul (2019), which identify that government controls various business actions within the private sector through the use of regulations, policies and taxes. This emphasises the impact that government has on organisations as a driver of the adoption of GSCM initiatives. One respondent identified that the government should implement a mandatory GSCM policy as they are best positioned to enforce these practices. This is indicative of government audits on organisations and is aligned with the insights of Sun et al. (2023) and Trevisan et al. (2023), who identify various taxes, levies and penalties that are incurred by organisations that do not adhere to regulations and policies. This also highlights the role of the government as an auditor of sustainable practices, which was also mentioned by the key informant.

Table 5.11 highlights respondents' responses in relation to which GSCM initiatives should be made mandatory within the pharmaceutical industry. The GSCM practices identified in the question to respondents were composed of assertions by Calignano and Mercurio (2023), Elbarky et al. (2023), Hyder et al. (2023), Jiakui et al. (2023), Öztürk and Asghar (2023), Rosano et al. (2022) and Sadiq et al. (2023). Respondents were given a scale between one and four to choose from for each initiative: (1) make mandatory, (2) important but not compulsory, (3) not important and (4) don't know. Respondents' responses were arranged from highest to lowest based on the percentage of responses that show that the GSCM should be made mandatory.

Table 5.11: Respondents' perceptions of key GSCM practices for the pharmaceutical industry (n=30, in %)

GSCM practice	**No answer**	**Make mandatory**	**Important but not compulsory**	**Not important**	**Don't know**
Using environmentally-friendly materials	3.3	60	23.3	-	13.3
Green production (using processes that are energy efficient and generate less waste)	-	60	26.7	-	13.3
Green procurement (sourcing from environmentally responsible partners)	-	60	26.7	-	13.3
Being a responsible corporate citizen (corporate social responsibility projects and investments)	3.3	56.7	16.7	-	23.3
Recycling (e.g. paper)	6.7	53.3	33.3	-	6.7
Reducing waste generation	6.7	53.3	33.3	-	6.7
Green packaging using environmentally-friendly packaging, recycling and reusing	3.3	50	16.7	6.7	23.3
Green warehousing (including eco-friendly features such as solar walls, on-site recycling, etc.)	3.3	46.7	23.3	3.3	23.3
Reuse (e.g. reusing durable packaging in supply change)	-	46.7	30	3.3	20
The green design of goods/ products (e.g. easier to transport, uses less energy, etc.)	3.3	43.3	30	6.7	16.7
Green transport and distribution (e.g. low carbon emission vehicles, route optimisation and shipping in bulk/ load optimisation)	3.3	40	30	10	16.7
Local sourcing of goods and services	-	40	43.3	6.7	10
Reverse logistics (reselling, refurbishing, remanufacturing, reusing and recycling goods)	3.3	33.3	40	3.3	20
Inventory management	6.7	30	30	13.3	20

More than half of the respondents (60%) identified that the use of environmentally-friendly materials should be mandatory. According to Das (2021), this implies that the majority of the respondents understand the importance of green products and the materials that are used to manufacture them. This is especially relevant for industries such as the pharmaceutical industry, as noted by Brechtelsbauer and Shah (2020), Biswas et al. (2023) and Bonnet et al. (2023), who indicate that materials used in the production of pharmaceutical products are highly hazardous to the environment. More than a fifth of the respondents (23.3%) identified that this initiative is important but should not be mandatory. As indicated by the key informant, the materials used in pharmaceutical products are specialised and alternative ingredients are not available for active pharmaceutical ingredients (the core ingredient of a product). This motivates the respondents' responses within the pharmaceutical sector. Four respondents indicated that they did not know what this meant, which corresponds to previous responses to questions on a lack of knowledge of GSCM initiatives, as indicated by Table 5.8. One respondent did not respond to this question.

Sixty percent of the respondents stated that they support the mandatory implementation of green production. This is aligned with the sentiments of Jain et al. (2020) and Ye et al. (2023), who state that green production is a critical initiative as it improves the environmental performance of organisations. More than a quarter of the respondents (26.7%) have identified that it is an important GSCM initiative but should not be made mandatory. This implies that the majority of the respondents support the initiative of green production in some capacity (86.7%). Four respondents (13.3%) indicated that they did not know what this initiative was, which is a recurring theme across most of the respondents' answers. This is an indicator that some of the respondents lack the relevant knowledge of GSCM initiatives.

Green procurement was noted to be a mandatory practice by 60% of the respondents, which indicates that the Logistics Department at CIPLA Medpro Manufacturing has a strong preference for this initiative. This also indicates that respondents value the importance of purchasing that is sustainable and perceive the impact of this GSCM initiative to be considerable, which is aligned with the assertions of Elbarky et al. (2023), Ivanova (2020) and Khan et al. (2023). Over a quarter of the respondents (26.7%) stated that it is important but should not be mandatory. This is an understandable perception as Sharma et al. (2020) identify that the pharmaceutical supply chains are highly complex due to specific material requirements. This also implies that the unique needs of the industry, such as raw materials, may limit procurement options. The key informant also identified that some of CIPLA Medpro Manufacturing’s raw materials are sourced from different countries as they are not available in South Africa. This further emphasises the purchasing limitations within the sector and validates the respondents’ responses. Four of the respondents (13.3%) identified that they did not know what this GSCM initiative was, which is concerning as it indicates that a number of CIPLA Medpro Manufacturing logistics staff lack the required knowledge of sustainable practices within the discipline of supply chain management. It is important to note that the Logistics Department are not tasked with the implementation of green procurement initiatives, but overall 86.7% of the respondents place a high value on the initiative.

Slightly more than half of the respondents (56.7%) stated that being a corporate citizen should be made mandatory, which is reflective of various initiatives that CIPLA Medpro Manufacturing is currently conducting, such as ‘Out of the Mouths of Babes’ and ‘Wisdom of the Ages’ (CIPLA, 2022). Five respondents (16.7%) also identified this initiative as being important but should not become mandatory. This shows that 73.3% of the respondents support this green initiative, which suggests that green practices conducted by the organisation impact the perception of staff members within the organisation. Seven respondents (23.3%) did not know what this meant, which is surprising, as CIPLA Medpro Manufacturing practices this through their community projects, as mentioned. This highlights the lack of visibility of CIPLA Medpro Manufacturing’s corporate social responsibility initiatives and communication with staff members, which relates back to the internal stakeholder theory. This could also be due to a lack of knowledge on the respondent's side, which highlights the importance of training in GSCM initiatives. One respondent did not respond to this question.

Recycling was identified as a practice that should be made mandatory by 53.3% of the respondents, which is reflective of the current initiatives conducted at CIPLA Medpro Manufacturing, according to insights from the key informant. This suggests that more than half of the respondents understand the importance of recycling within the pharmaceutical industry, which is aligned with the sentiments of Hirsch (2021), Ramos et al. (2022) and Suhandi and Chen (2023). A third of the respondents (33.3%) stated that recycling is important but should not be made mandatory. As indicated in the key informant, not all materials are recyclable in the pharmaceutical industry and, if packing material such as foil is damaged, it has to be shredded and disposed of correctly. This could be the motivation behind this initiative not being mandatory for all materials. Two respondents did not respond to this question, which indicates that they did not know what this was or were not interested in answering the question. This is concerning as the key informant identified that CIPLA Medpro Manufacturing is involved in a number of recycling initiatives and has provided access to recycling bins on-site. This would suggest that these respondents either do not recycle on-site or do so without understanding the purpose of this initiative. However, it is important to note that compared to responses to other questions, it had the least number of respondents indicating that they did not know of this GSCM initiative. This suggests that CIPLA Medpro Manufacturing's involvement in GSCM initiatives influences respondents' understanding of these initiatives.

The responses on the reduction of waste generation and recycling were the same, which also highlights CIPLA Medpro Manufacturing's influence on employees' perception of green initiatives. The key informant highlighted the waste reduction initiatives that CIPLA Medpro Manufacturing is involved with and that recycling and waste reduction were the key green initiatives across the organisation. More than half of the respondents (53.3%) stated that the reduction of waste generation should be a mandatory practice, whilst 33.3% of the respondents identified that it is important but should not be mandatory. This emphasises that the vast majority of logistics staff members (86.7%) support the reduction of waste generation initiatives, which is aligned with the assertions of Jin et al. (2018), Nascimento et al. (2018), Negi et al. (2021), Olutola and Wichmann (2020), Xiong et al. (2023) and Ye et al. (2023) that indicate that the reduction of waste generation directly impacts a reduction of land, air and water pollution depending on the organisation, which in turn improves both environmental and economic performance. Two respondents indicated that they did not know what was meant by this green initiative, which is concerning, as it is a main initiative according to the key informant. Two respondents did not respond to this question, raising concerns about a lack of interest in this initiative even though it is conducted by CIPLA Medpro Manufacturing or it could be attributed to a lack of knowledge.

Half of the respondents agreed that green packaging should be mandatory within the pharmaceutical industry. This is a positive as it indicates that a large number of logistics employees at CIPLA Medpro Manufacturing support a reduction in land pollution, which is aligned with the insights by Acharjee et al. (2023) and Takunda and Steven (2023), who state that microplastics and packaging materials from pharmaceutical products contribute to land pollution. Less than a fifth of the respondents (16.7%) stated that this was important but should not be mandatory, which could be indicative of the packaging requirements of pharmaceutical products, which was noted by the key informant who stated that packaging materials in the pharmaceutical industry are specialised to ensure the protection and efficacy of the product. Two respondents felt that it was not important, which goes against the assertions of Takunda and Acharjee et al. (2023), Kim (2021) and Steven (2023), who identify the need for environmentally-friendly materials to reduce the waste at landfill sites. More than a fifth of the respondents (23.3%) do not know the meaning of green packaging within the pharmaceutical industry. This builds on the theme of a lack of knowledge on GSCM initiatives within the Logistics Department at CIPLA Medpro Manufacturing, and is an area of concern as the pharmaceutical industry needs to move towards green packaging due to environmental concerns, as noted by Acharjee et al. (2023) and Takunda and Steven (2023).

Green warehousing was identified as being a mandatory requirement within the pharmaceutical industry by 46.7% of the respondents. This suggests that this initiative is valued by a large number of respondents at CIPLA Medpro Manufacturing and is a critical GSCM initiative, as noted by the assertions of Calignano and Mercurio (2023), Guo et al. (2023b), Martins and Carton (2023) and Morrison (2022). Seven respondents (23.3%) indicated that green warehousing is important but should not be mandatory. This suggests that 70% of the respondents support this initiative in some capacity, which is aligned with the sentiments of Guo et al. (2023b) and Martins and Carton (2023), who highlight the importance of green warehousing within the pharmaceutical industry. One respondent stated that this initiative is not important, which goes against the insights by Modica et al. (2021) that emphasise that this initiative directly impacts the organisation's profit margins, savings and operational success. Seven respondents (23.3%) did not know what this initiative was, which indicates a lack of awareness and knowledge by a substantial number of the logistics team at CIPLA Medpro Manufacturing, which is an area of significant concern as the Logistics Department is the driver of green warehousing, which is an essential GSCM initiative within the pharmaceutical industry, as noted by Guo et al. (2023b) and Martins and Carton (2023). The key informant noted that CIPLA Medpro Manufacturing is involved with green warehousing initiatives such as the reduction of electricity usage, which indicates that respondents are involved with this initiative but are unaware of it. This highlights a need for training within the Department, as noted by the internal stakeholder theory, which identifies that employees must be trained and aware of initiatives that they are involved with, according to Brogi et al. (2022). One respondent did not respond to this question, indicating a lack of interest or knowledge.

Less than half of the respondents (46.7%) would prefer that the reuse of materials become mandatory within the pharmaceutical sector. This suggests that there is the capacity to implement the reuse of various materials within the pharmaceutical sector. Thirty percent of the respondents identified the reuse of materials as being important but should not be mandatory. Thus, 76.7% of the respondents support this initiative within the pharmaceutical industry to some degree, which is aligned with the sentiments of Suhandi and Chen (2023), who state that the reuse of materials in the pharmaceutical industry is important. One respondent identified that they do not perceive this initiative as important within the pharmaceutical industry, which goes against the assertions of Hirsch (2021), Matthews et al. (2021), Ramos et al. (2022) and Suhandi and Chen (2023), who argue that it is a critical practice in the creation of a circular economy. Twenty percent of the respondents did not know what was meant by reuse within the pharmaceutical industry, which is an area of concern as noted by and Pan et al. (2019) and Suhandi and Chen (2023), as they indicate that the reuse is a critical building block of sustainable development, therefore, all staff members at CIPLA Medpro Manufacturing must be aware of this initiative. However, the trend of lack of knowledge on GSCM initiatives by some respondents has been a recurring theme during this study as noted in the previous Tables.

Less than half of the respondents (43.3%) indicated that they perceive that the green design of products should be mandatory, which is aligned with the sentiments of Khan et al. (2023) and Öztürk and Asghar (2023). However, fewer respondents (43.3%) value green design as a mandatory process compared to green production (60%). This could again be related to the uniqueness of pharmaceutical products and the limitations that were identified by the key informant with regard to specific materials that are required in the composition of both the pharmaceutical product and the packaging. Thirty percent of the respondents stated that this GSCM initiative is important but should not be mandatory, which indicates that these are beginning to understand the benefits of green design, which is highlighted by Gao et al. (2018), Hu (2020), Khan et al. (2023), Liu and Chen (2023) and Öztürk and Asghar (2023). Two respondents identified that this is not an important initiative. This is concerning as the green design of products is critical in the creation of a circular economy, according to Jain et al. (2020) and Liu and Chen (2023). Five of the respondents (16.7%) identified that they did not understand this initiative, which further emphasises the lack of knowledge of this initiative, which relates back to the level of awareness, which is a necessity in ensuring the success of

GSCM initiatives, as noted in the internal stakeholder theory. One respondent did not answer this question, which could be attributed to a lack of knowledge as it has been a recurring theme. Twelve respondents (40%) identified that green transportation and distribution should be mandatory within the pharmaceutical sector. This is aligned with the sentiments of Ahmad and Satrovic (2023), Grinin et al. (2023) and Rakhmangulov et al. (2017), who assert that logistics can significantly improve environmental performance. Thirty percent of the respondents indicated that green transport and distribution are important but should not be made mandatory. This could be a result of the sourcing of materials, which are sometimes imported by CIPLA Medpro Manufacturing due to scarcity, which was highlighted by the key informant. Therefore, taking into consideration the distance and handling requirements, it may not be a feasible option for the organisation. Ten percent of the respondents identified this initiative as not being important, which goes against the assertions of Ahmad and Satrovic (2023), Grinin et al. (2023), Rakhmangulov et al. (2017) and Zhao et al. (2023), which suggests that green transport and distribution is a critical initiative in sustainable development. Five respondents (16.7%) did not know what this initiative was, which highlights a lack of knowledge. One respondent did not answer this question.

The local sourcing of goods was noted to be made a mandatory requirement by 40% of the respondents. This initiative falls under the spectrum of green purchasing, according to the assertions of Bryngemark et al. (2023) and Ivanova (2020), as indicated by the statement that green procurement focuses on the development of local suppliers and small-medium businesses. However, the researcher had separated this initiative to determine whether the responses by the logistics team at CIPLA Medpro Manufacturing on green procurement were impacted by the scarcity of the required raw materials in South Africa. The responses on the mandatory implementation of green procurement were chosen by 60% of the respondents against the mandatory implementation of local sourcing, which was chosen by 40% of the respondents. This indicates that at least 20% of the respondents are cognisant of the limited sources of supply available to CIPLA Medpro Manufacturing in South Africa. Furthermore, 43.3% of the respondents consider this initiative to be important but should not be mandatory, which could be reflective of the pharmaceutical raw material scarcity in South Africa, as indicated in the previous discussion. Ten percent of the respondents indicated that they did not know what local sourcing was. Overall, 83.3% of the respondents place a high level of importance on this GSCM initiative, which correlates with the feedback received on the blanket GSCM initiative of green procurement. However, an important finding is that fewer respondents support the mandatory implementation of local procurement as opposed to green procurement. The key informant also identified the lack of local sources of raw materials as a concern as it limited the route optimisation and the local sourcing of materials.

A third of the respondents (33.3%) stated that reverse logistics should be a mandatory initiative, which is aligned with the insights of Mallick et al. (2023), Ni et al. (2023) and Zarbakhshnia et al. (2020). Sharma et al. (2020) further state that the core purpose of reverse logistics is to rework, reuse and recycle products, which is very important within the pharmaceutical industry due to pharmaceutical products being potentially hazardous to both humans and the environment if not disposed of properly. Therefore, the backward movement of expired products into the organisation for proper disposal is critical. Forty percent of the respondents indicated that this was very important but should not be mandatory. This could be a result of the feasibility of this process as products cannot be tracked when they are shipped out for sale. Therefore, pharmaceutical products would possibly stay on consumers' shelves for long periods of time and, subsequently, be disposed of as general waste. The key informant mentioned that the key concern is a matter of processes and feasibility. A system needs to be created that facilitates the reverse movement of CIPLA Medpro Manufacturing's products back to the plant for proper disposal. One respondent indicated that they did not perceive this as an important initiative, which is a relatively small number but does indicate that some staff members do not understand the impact of poorly disposed pharmaceutical products on the environment. Twenty percent of the respondents identified that they did not know what this initiative was. As a core supply chain management process, all logistics staff at CIPLA Medpro Manufacturing should understand this concept and this emphasises the lack of knowledge within the Department, which directly impacts the success of this GSCM initiative, according to the internal stakeholder theory.

Inventory management is a subset of green warehousing, which is identified by Oloruntobi et al. (2023), who state that this initiative is focused on waste reduction and inventory optimisation. Thirty percent of the respondents identified that inventory management should be made mandatory, which indicates that a relatively small number of the respondents support this initiative as opposed to 46.7% of the respondents who support green warehousing even though both initiatives are aligned to some degree, as noted by Oloruntobi et al. (2023). Thirty percent of the respondents stated that sustainable inventory management is important but should not be mandatory. As the core team working with inventory management at CIPLA

Medpro Manufacturing, the respondents' responses suggest that they value the importance of this initiative but are reluctant to make it a mandatory requirement. This was identified as an area of concern by the key informant due to high levels of wastage due to poor inventory management. However, the key informant identified that the organisation was focusing on gaining economies of scale through bulk purchasing, which impacted inventory management efficiency. Therefore, it is an area that the organisation should focus on improving to drive better sustainable performance. Four respondents identified that this is not an important GSCM initiative, which is problematic as it indicates that some of the staff within the Logistics Department are unaware of the issues that are currently impacting their Department and directly impact sustainable performance, as noted by Oloruntobi et al. (2023) and Usman et al. (2023). Twenty percent of the respondents indicated that they did not know what this initiative was, which is also an area of concern as it is driven and implemented by the Logistics Department, according to the key informant. Two respondents did not respond to the question.

The most important GSCM practices that should be made mandatory for the pharmaceutical industry, according to respondents, were green procurement (60%), green production (60%), use of environmentally-friendly materials (60%) and being a responsible corporate citizen (56.7%). This aligns with assertions by Biswas et al. (2023), Bonnet et al. (2023), Brechtelsbauer and Shah (2020), Elbarky et al. (2023), Khan et al. (2023) and Ye et al. (2023). The results from Table 5.13 identify that respondents are aware of the importance of various GSCM initiatives within the pharmaceutical industry but also highlight that there is a knowledge gap within the Logistics Department. This is an area for concern as it indicates that respondents are involved with implementing initiatives that they are unaware of, which highlights the importance of additional training on GSCM practices. According to Ali and Kaur (2021), Brogi et al. (2022), Maskrey et al. (2023) and Zouari-Hadiji (2023), knowledge gaps directly impact the performance of sustainable initiatives, which is also highlighted in the internal stakeholder theory and risk identification theory.

Table 5.12 highlights the respondents' responses on the extent to which specific GSCM initiatives should be implemented by businesses generally. Respondents were given a scale between one and four to choose from for each initiative: (1) make mandatory, (2) important but not compulsory, (3) not important and (4) don't know. Respondents' responses were arranged from highest to lowest based on the percentage of responses that indicated that the GSCM should be made mandatory. The purpose of this question was to determine which

GSCM initiatives respondents perceived to be more important for businesses as a comparison to the results for the pharmaceutical industry noted in Table 5.13. This was done to determine if there were differences in perceptions for businesses in general and the pharmaceutical industry.

Table 5.12: Respondents' perceptions of key GSCM practices for business in general (n=30 in %)

GSCM practice	**No answer**	**Make mandatory**	**Important but not compulsory**	**Not important**	**Don't know**
Recycling (eg. paper)	-	70	26.7	-	3.3
Being a responsible corporate citizen (corporate social responsibility projects and investments)	3.3	60	16.7	-	20
Reuse (eg. reusing durable packaging in supply change)	6.7	60	20	-	13.3
Reducing waste generation	-	56.7	30	-	13.3
Using environmentally-friendly materials	3.3	56.7	30	-	10
Green packaging using environmentally-friendly packaging, recycling and reusing	3.3	53.3	23.3	6.7	13.3
Green production (using processes that are energy efficient and generate less waste)	10	53.3	23.3	-	13.3
Green procurement (sourcing from environmentally responsible partners)	10	46.7	30	-	13.3
Green transport and distribution (eg. low carbon emission vehicles, route optimisation and shipping in bulk/ load optimisation)	3.3	46.7	20	10	20
The green design of goods/ products (eg. easier to transport, uses less energy, etc.)	3.3	40	40	3.3	13.3
Green warehousing (including eco-friendly features such as solar walls, on-site recycling, etc.)	3.3	40	33.3	3.3	20
Local sourcing of goods and services	10	36.7	40	6.7	6.7
Reverse logistics (reselling, refurbishing, remanufacturing, reusing and recycling goods)	3.3	30	50	3.3	13.3
Inventory management	3.3	26.7	43.3	10	16.7

Recycling was stated to be a mandatory initiative for business in general by 70% of the respondents. This is significantly less than the responses on the mandatory implementation of recycling within the pharmaceutical sector (53.3%). This suggests that there are barriers to recycling within the pharmaceutical industry, as indicated by the key informant with regard to non-recyclable materials such as foils and certain raw materials. More than a quarter of the respondents (26.7%) indicated that recycling is important but should not be mandatory for business. This indicates that 96.7% of the respondents support this initiative, which is closely aligned with responses for recycling within the pharmaceutical sector (86.7%). The response rate of this initiative indicates that employees' perceptions of GSCM initiatives are influenced by the current initiatives conducted by the organisation. The motivation behind this perception is that recycling is conducted by all departments by CIPLA Medpro Manufacturing, as indicated by the key informant and it has been the highest supported GSCM initiative. One respondent identified that they did not know about this initiative, which indicates that a staff member within the Logistics Department did not have knowledge of this basic GSCM initiative, which is an area of concern as indicated by Islam et al. (2023) and Pan et al. (2019) who state that recycling and reuse are the foundation of GSCM.

Sixty percent of the respondents stated that it should be mandatory for businesses to be responsible corporate citizens, which is aligned with the insights of Elneel et al. (2023), Freudenreich et al. (2020), Purvis et al. (2018) and Shahzad et al. (2023), who states that businesses must support the community, stakeholders and employees and ensure that the social pillar of sustainability is upheld and is aligned with the framework of the internal stakeholder theory. Five respondents (16.7%) stated that this initiative is important but should not be mandatory. This indicates that 76.7% of the respondents support this initiative to some degree. Twenty percent of the respondents stated that they did not know what this initiative was. One respondent did not respond to this question.

Reuse was indicated to be a mandatory GSCM initiative for business by 60% of the respondents, which is aligned with the sentiments of Matthews et al. (2021), Pan et al. (2019) and Suhandi and Chen (2023), who state that this initiative is critical in the creation of a circular economy. Twenty percent of the respondents stated that this initiative was important but should not be made mandatory. This indicates that 80% of the respondents support this initiative to some degree for business, which is slightly more than respondents’ responses in the pharmaceutical sector (76%). This could be attributed to the lack of reusable material (such as foils) within the pharmaceutical industry, which was indicated by the key informant. Four respondents (13.3%) identified that they did not know what was meant by this initiative. This reflects the lack of knowledge of GSCM in general from the Logistics Department at CIPLA Medpro Manufacturing. However, 20% of the respondents indicated that they do not understand this initiative within the pharmaceutical sector, which indicates that respondents are less aware of the concept of reuse within the industry that they work in, which resonates with the recurring theme of a lack of knowledge on GSCM initiatives within the Logistics Department at Cipla Medpro Manufacturing. Two respondents did not respond to this question.

The reduction of waste generation was stated to be made mandatory by 56.7% of the respondents. This aligns with the perceptions of Morseletto (2020) and Paras and Pal (2020), who identify that waste reduction is a core component of the creation of a circular economy, especially by industry. Thirty percent of the respondents identified that this initiative was important but not a mandatory requirement for a business. This indicates that 86.7% of the respondents support this initiative, which further supports that an organisation's involvement in GSCM initiatives influences staff perceptions. This is motivated by CIPLA Medpro Manufacturing's focus on waste reduction initiatives, as identified by the key informant. Respondents also share the same perspective within the pharmaceutical sector, as indicated by respondents' responses to the same question within the pharmaceutical sector (86.7%). Four respondents (13.3%) identified that they did not know what this initiative meant for business in general, which reflects the lack of knowledge by some of the CIPLA Medpro Manufacturing logistics staff.

The use of environmentally-friendly materials was stated to be made mandatory by 56.7% of the respondents, which is aligned with the assertions of Das (2021), Elsayad et al. (2023), Kim et al. (2023) and Öztürk and Asghar (2023) who identify the importance of environmentally-friendly materials in the manufacturing of green products. Jain et al. (2020) further outline the importance of this initiative by identifying that it fulfils a crucial role in green consumption and production. Thirty percent of the respondents identified that environmentally-friendly materials are important but should not be made mandatory, which indicates that 86.7% of the respondents support this initiative to some degree for businesses in general. Ten percent of the respondents identified that they did not know what was meant by this initiative, which is less than in the pharmaceutical sector (13.3%), which is an unexpected finding. This relates back to information provided by the key informant who stated that materials in the pharmaceutical industry are highly unique, which means that packaging and other materials may not have environmentally-friendly materials alternatives. One respondent did not respond to this question.

More than half of the respondents (53.3%) stated that green packaging should be a mandatory practice for businesses, in general, which aligns with the insights of Khan et al. (2023), Lutfi et al. (2023), Pan et al. (2019) and Wandosell et al. (2021) that identify the importance of reusable and recyclable material in reducing a business's environmental impact. More than a fifth of the respondents (23.3%) indicated that green packaging is important but should not be made mandatory, which indicates that 76.7% of the respondents support this initiative for businesses in general, which is greater than the responses to green packaging within the pharmaceutical sector (70%). The variance could be reflective of the unique requirements discussed by the key informant with regard to product requirements and, subsequently, the packaging that is required to uphold product quality, which was also noted by Khan et al. (2023). Two respondents (6.7%) indicated that this initiative is not important to businesses, which is the same number of responses as with the pharmaceutical sector. This suggests that a small number of the respondents do not understand the benefits of green packaging for both the environment and businesses. Four respondents (13.3%) identified that they do not understand the meaning of green packaging in business, which is a large variance between the lack of knowledge of this initiative indicated in the pharmaceutical sector (23.3%). This indicates that respondents did not know of sustainable packaging alternatives within the pharmaceutical sector, which further emphasises the unique requirements of packaging materials within the pharmaceutical sector. One respondent did not respond to this question.

Green production was stated to be made mandatory by 53.3% of the respondents, which suggests that the majority of the respondents support this initiative for business in general (similarly to the pharmaceutical sector 60%). This is aligned with the sentiments of Halder et al. (2020), Jain et al. (2020), Nguyen et al. (2019) and Ye et al. (2023), who indicate that green production is essential in the creation of sustainable businesses. More than a fifth of the respondents (23.3%) stated that this initiative is important but should not be made mandatory, which indicates that 76.7% of the respondents support green production in businesses to some degree. This is less than within the pharmaceutical sector (86.7%) and suggests that respondents value this initiative more in their own sector than in business in general. Four respondents (13.3%) stated that they did not know what was meant by this initiative, which aligns with respondents' answers on this initiative within the pharmaceutical sector. This indicates that these respondents legitimately do not understand the meaning of this GSCM initiative. Ten percent of the respondents did not respond to this question, which indicates a lack of interest or knowledge by respondents with regard to this initiative in sectors other than the pharmaceutical sector.

Green procurement was indicated to be made mandatory for business in general by 46.7% of the respondents, which is aligned with the insights of Bryngemark et al. (2023), Galeazzo et al. (2021), Ivanova (2020) and Khan et al. (2023), which identifies that this initiative is critical for the industry as it improves sustainable performance and reduces the cost structure of an organisation. This differs from respondents' answers with regard to the pharmaceutical industry, which was 60%, therefore, respondents perceive that green procurement is more important within their industry as opposed to others. This could be attributed to a lack of knowledge of other industries. Thirty percent of the respondents stated that green procurement is important but should not be made mandatory in businesses. This indicates that 76.7% of the respondents support the adoption of green procurement by businesses, which is a positive response, as it indicates that the majority of the respondents value this GSCM initiative. Ten percent of the respondents did not respond to this question, which indicates that these respondents are not concerned with this initiative with regard to business in general or that they lack the necessary insights into industries other than the pharmaceutical sector, as all respondents answered this question when it was related to the pharmaceutical sector. Four respondents (13.3%) stated that they did not know what this initiative was, which is the same number of respondents as in the pharmaceutical sector. This indicates that several respondents do not know about GSCM initiatives, which reflects back on the theme of a lack of knowledge by the logistics staff at CIPLA Medpro Manufacturing.

Green transportation was recommended to be a mandatory GSCM initiative for businesses by 46.7% of the respondents, which is more responses than the pharmaceutical sector (40%). This is indicative that there are potentially more barriers to green transportation within the pharmaceutical sector as opposed to other industries. The motivation for this was identified by the key informant, who indicated that due to the scarcity of raw materials required for production and purchasing in economies of scale, transport options can be limited. Twenty percent of the respondents identified this initiative as important but not a mandatory requirement. This indicates that 66.7% of the respondents support green transportation for businesses in general, which is aligned with the assertions of Agyabeng-Mensah (2020), Hussain et al. (2023), Satrovic (2023) and Zhao et al. (2023) who indicate that green transportation is important as it impacts the environmental performance of an organisation. Ten percent of the respondents stated that this initiative is not important for a business, which contradicts the assertions of Rodrigue et al. (2017) and Satrovic (2023), who identify that transportation is a core contributor to pollution globally. Twenty percent of the respondents identified that they did not understand what this initiative was for business in general, which is concerning as transportation is a key component of the Logistics Department, according to Agyabeng-Mensah (2020) and Hussain et al. (2023). One respondent did not answer this question.

Forty percent of the respondents indicated that the green design of products should be mandatory for business in general. This is aligned with the insights of Hong et al. (2019), Liu and Chen (2023) and Öztürk and Asghar (2023), who identify that green design is an important GSCM initiative for all businesses as it improves environmental performance, helps organisations meet governmental regulations and attracts customers. Forty percent of the respondents indicated that green design was important but should not be made mandatory. This suggests that 80% of the respondents support this initiative but more so for business in general as opposed to the pharmaceutical sector (73.3%). This, again, could be reflective of the limitations within the industry on the design of products as well as storage requirements, as discussed by the key informant. One respondent identified that this initiative is not important, which goes against the insights of Hu (2020), who asserts that green design is a critical technique offered to companies to improve their environmental performance as it facilitates the creation of biodegradable products. Four respondents (13.3%) did not know what green design is, which is an area of great concern as this is similar to respondents' answers with regard to the pharmaceutical industry (16.7%). The lack of knowledge can be identified as a recurring theme for both the pharmaceutical industry and business in general by the logistics team at CIPLA Medpro Manufacturing and is a serious area of concern based on the internal stakeholder theory, as noted by Brogi et al. (2022). One respondent did not respond to this question.

Green warehousing was indicated as a mandatory GSCM initiative for businesses by 40% of the respondents, which is aligned with the assertions of Guo et al. (2023b), Mashud et al. (2021), Morrison (2022) and Oloruntobi et al. (2023), who stated that green warehousing is a crucial advancement in sustainable development. A third of the respondents (33.3%) identified that green warehousing was important but should not be made mandatory. This indicates that 73.3% of the respondents support the initiative of green warehousing, which is similar to the responses that supported this initiative within the pharmaceutical sector (70%). This suggests that this initiative is important for all businesses, including those within the pharmaceutical sector. One respondent indicated that this initiative was not important, which is the same as the response rate concerning the pharmaceutical sector. This indicates that a small number of respondents have a poor understanding of this initiative, as it goes against the insights of Morrison (2022), who identifies green warehousing as important as it has a host of benefits such as consumer brand loyalty, increased employee satisfaction and increased savings. Twenty percent of the respondents indicated that they did not understand this initiative, which is closely aligned with responses within the pharmaceutical sector (23.3%). This suggests that a number of logistics staff at CIPLA Medpro Manufacturing do not understand this initiative in both a business and pharmaceutical context, which is an area of concern based on the internal stakeholder theory, as mentioned earlier. One respondent did not respond to this question.

More than a third of the respondents (36.7%) supported the mandatory implementation of the local sourcing of goods by businesses, which is slightly less than the pharmaceutical sector (40%). Forty percent of the respondents indicated that the local sourcing of goods by businesses, in general, is important but should not be made mandatory. Overall this indicates that 76.7% of the respondents would support the local sourcing of goods for businesses in general, which is supported by the assertions of Bryngemark et al. (2023) and Ivanova (2020) that indicate that the local sourcing of goods improves the environmental performance of organisations. Two respondents (6.7%) identified the local sourcing of goods as being unimportant, which is concerning as Ivanova (2020) asserts that the development of local suppliers and small-medium businesses will contribute to developing the other pillars of sustainability. This suggests that a small number of respondents are unaware of the impact that local sourcing has on the country and the organisation. Ten percent of the respondents did not respond to this initiative, which highlights that several respondents do not place importance on this initiative in other sectors as opposed to their own, as this question was answered by all respondents when it was directed to the pharmaceutical sector. It could also indicate that respondents are unaware of the importance of the local sourcing of goods for organisations outside of their own.

Reverse logistics was identified as being a mandatory requirement by 30% of the respondents, which is aligned with the assertions of Akter et al. (2022), Cahyono et al. (2023), Hyder et al. (2023), Martins and Marto (2023) and Paras and Pal (2020) who stated that reverse logistics is highly beneficial to organisations across all industries as it has financial and environmental benefits. Half of the respondents stated that reverse logistics is important but should not be made mandatory. This suggests that 80% of the respondents support this initiative across businesses in general, which is greater than the responses in the pharmaceutical sector (73.3%). The aspect of the complexity of reverse logistics within the pharmaceutical sector was discussed by the key informant, which is most likely a contributor to this variance. However, Sharma et al. (2020) show that pharmaceutical products are much more hazardous than most general waste and that they should be disposed of properly, which, therefore, highlights that reverse logistics is equally important within the pharmaceutical industry. One respondent indicated that reverse logistics is not important, which indicates that a small number of respondents do not understand the importance of this initiative. Four respondents (13.3%) stated that they did not know what this initiative meant for business in general, whilst one respondent did not respond to this question, which relates back to the theme of a lack of knowledge of GSCM initiatives.

More than a quarter of the respondents (26.7%) indicated that they would support the mandatory implementation of sustainable inventory management for businesses in general. This is aligned with the assertions of Morrison (2022), Oloruntobi et al. (2023) and Usman et al. (2023), who state that inventory management is an element of green logistics, which is a key GSCM initiative for all businesses. Less than half of the respondents (43.3%) perceived that sustainable inventory management was important but should not be made mandatory. This indicates that 70% of the respondents supported this initiative to some degree for businesses in general. This is more than the pharmaceutical sector (60%), which suggests that there is an underlying motivation for the lack of support for this initiative within the pharmaceutical sector. The motivation behind the variance in responses between the pharmaceutical sector and business, in general, could be due to limitations discussed by the key informant, such as bulk buying initiatives, which can lead to wastage. Ten percent of the respondents indicated that this initiative is not important for business in general, which goes against the sentiments of Morrison (2022) and Sharma et al. (2021), who indicate that green logistics initiatives such as warehousing are very important to achieve a circular economy as well as improve business performance. Less than a fifth of the respondents (16.7%) stated that they did not know what was meant by this initiative, which identifies that respondents have a lack of knowledge of GSCM initiatives in general and that it is not unique to the pharmaceutical industry (20%). One respondent did not respond to this question.

According to respondents' responses, the most important GSCM practices that should be made mandatory for business in general, according to respondents, were recycling (70%), being a responsible corporate citizen (60%) and reducing waste generation (56.7%). Respondents' perceptions of GSCM initiatives are likely to be influenced by organisational practices. The motivation is that these three initiatives are currently being conducted by CIPLA Medpro Manufacturing across all business units, according to information provided by the key informant. It is interesting to note that respondents identified green procurement (60%), green production (60%) and the use of environmentally-friendly materials (60%) as mandatory GSCM initiatives within the pharmaceutical sector, which varies from responses for business in general, this could be as a result of the gaps in CIPLA Medpro Manufacturing's GSCM strategy, as only green production was mentioned to some degree by the key informant as an initiative currently conducted at the organisation.

The least important GSCM practices that should be made mandatory were identified as green transportation and distribution (10%), inventory management (10%), local souring of goods (6.7%) and the use of green packaging (6.7%). This highlights areas for development within the organisation as it is reflective of either a lack of knowledge or exposure to these GSCM initiatives. The practices that respondents had the least responses were green warehousing (20%), green transportation (20%) and being a responsible corporate citizen (20%). This identifies the need for proper training of the logistics team at CIPLA Medpro Manufacturing as these initiatives are conducted within the institution. The internal stakeholder theory, according to Stocker et al. (2020), states that employees tasked with the adoption of business initiatives must have a strong understanding of those initiatives as it will directly impact the success rate. Therefore, employees must establish a better understanding of the above-mentioned initiatives.

The respondents' perception of the benefits of GSCM in CIPLA South Africa was probed. A list of possible benefits associated with GSCM was chosen based on the three pillars of sustainability based on insights by Gomez and Crowther (2022), Jie et al. (2023) and Purvis et al. (2018). The respondents were asked to tick all the options that applied. Table 5.13 depicts the frequency of responses arranged from highest to lowest. The most significant benefits associated with GSCM at CIPLA, according to respondents' responses, were societal benefits to improve quality of life (76.7%), environmental benefits (73.3%), improving the company's reputation and brand (73.3%) and the reduction of environmental health and risks (73.3%). This correlates with Galeazzo et al. (2021), who state that the focus of GSCM practices is aligned with both reputational and brand performance. According to Ivanova (2020), there is also a positive relationship between GSCM initiatives and society.

Table 5.13: Respondents' perception of the benefits of GSCM to CIPLA South Africa (n=30)

Benefit	**Frequency**	**%**
General societal benefits to improve the quality of life of people and nature (ethical behaviour)	23	76.7
Environmental benefits/ sustainability of resources (fewer carbon emissions)	22	73.3
Improves the company's reputation and brand	22	73.3
Reducing environmental/ health risks (safer and secure work environment)	22	73.3
Aim marketing at customers who value environmentally responsible practices	14	46.7
Improved quality and better products	14	46.7
Increased employee satisfaction	13	43.3
Increased customer satisfaction/ loyalty	13	43.3
The positive impact of the company's financial performance	11	36.7
Lower cost for consumers as a result of increased efficiency	11	36.7
Increased innovation in the industry	11	36.7
Reduces operational costs	10	33.3

Less than half of the respondents identified aim marketing at customers who value environmentally responsible practices (46.7%), improved quality and better products (46.7%), increased employee satisfaction (43.3%), and increased customer satisfaction/ loyalty (43.3%) to be benefits associated with GSCM at CIPLA. Interestingly, just over a third of the respondents indicated that GSCM would benefit CIPLA financially – a positive impact on the company's financial performance (36.7%), and reduced operational costs (36.7%). This is a concerning response, as Epstein et al. (2018), Filho et al. (2020), Sgroi et al. (2018), Sweeney (2020) and Wang et al. (2018) note that cost savings and reductions are key drivers to the adoption of GSCM. This also indicates that only a small number of respondents understand the concepts of the pillars of sustainability as the economic pillar of sustainability is equally important, as indicated by Epstein et al. (2018). This reflects on the theme of a lack of knowledge by logistics staff at CIPLA Medpro Manufacturing on GSCM initiatives, which have been seen in a number of questions throughout the survey.

Similarly, just over a third of the respondents believed that the adoption of GSCM practices in CIPLA would result in lower costs for consumers. Lee et al. (2020) state that a reduction in overhead costs impacts the final product price within the pharmaceutical industry, however, it is important to note that organisations may calculate their respective product markup differently, so this may not be the procedure followed by CIPLA Medpro Manufacturing. Further research is required to determine if cost reductions would indeed affect product prices at CIPLA Medpro Manufacturing.

More than a third of the respondents (36.7%) identified that GSCM would improve innovation within the industry, which aligns with Seman et al. (2019), who highlight the positive relationship between GSCM and innovation within the industry. Seman et al. (2019) state that innovation is created through the creation of sustainable practices and finding ways to reduce environmental impact and wastage. However, as mentioned by the key informant as well as assertions by Löfgren (2017), the pharmaceutical industry is highly regulated, which may impact the flexibility of innovation within the industry. Further research is required to determine the full impact of regulations and legislation on GSCM within the pharmaceutical industry to understand the boundaries of sustainable innovation within this sector.

An important theme that is highlighted by this information is the link between GSCM and overall societal and environmental benefits. This was also identified by Herbon and Tsadikovich (2023), Ojijo (2023) and Srivastava (2022), who agreed that the benefits are evident in both social and environmental spectrums. This leads to the assumption that the implementation of sustainable initiatives, such as GSCM, directly improves social wellness and environmental performance. Further research is required to determine the impact of GSCM initiatives on these two elements, but it can be suggested that there is a positive correlation between social and environmental performance and the implementation of GSCM within an organisation.

5.4 Internal and external barriers affecting the implementation of green logistics at CIPLA Medpro Manufacturing

The barriers identified in Table 5.16 were identified by literature in previous chapters as core factors impacting GSCM. The researcher included a field for other barriers that impact GSCM at CIPLA Medpro Manufacturing but there were no additional barriers identified by the respondents. The barriers highlighted in Table 5.14 were a combination of both internal and external barriers and were separated by the researcher, according to assertions by Alp et al. (2022), Altunay et al. (2021), Amlan et al. (2023), Birasnav et al. (2022), Boean (2023), Fang et al. (2022), Fatima and Mukhtar (2023), Khalid et al. (2023), Kim et al. (2023), Malek and Desai (2019), Özaşkın and Görener (2023), Palit et al. (2022), Panwar et al. (2023), Rahman et al. (2020), Ranieri et al. (2018), Sharma et al. (2023), Sodhi et al. (2023), Suraharta et al. (2023), Tao et al. (2023),Yang et al. (2023) and Zighan et al. (2023) that highlight various internal barriers (occur within the boundaries of the organisation) and external barriers (occur outside the boundaries of the organisation). Respondents were encouraged to highlight which factors they perceived negatively impacted GSCM practices at CIPLA South Africa. The options provided to respondents were (1) Yes, (2) Maybe and (3) No. Respondents were also provided additional space to motivate for the reason behind their response if the factor was identified as a barrier.

Table 5.14: Respondents' insights into the factors that negatively affect the implementation of GSCM practices at CIPLA South Africa (n=30, in%)

Factors	No response	Yes	Maybe	No	Type of barrier	Reason
High cost	-	36.7	50	13.3	Internal	High financial implications; Lack of funds; Negative impact on company profit margins
Lack of training	3.3	30	36.7	30	Internal	No training
Lack of understanding to incorporate green buying	3.3	26.7	50	20	Internal	Awareness by the procurement department
Lack of skilled human resources in the implementation of GSCM	3.3	26.7	46.7	23.3	Internal	No training; Not core competency
Lack of government support	3.3	13.3	73.3	10	External	Proper enforcement of policy
Lack of awareness in society	6.7	13.3	63.3	16.7	External	No response provided
Lack of knowledge and experience among suppliers	6.7	13.3	63.3	16.7	External	No training
Lack of understanding among supply chain stakeholders	6.7	13.3	66.7	13.3	Internal	No training
Cost reduction at the cost of the environment	3.3	10	63.3	23.3	Internal	No response provided
Lack of management commitment	3.3	10	46.7	40	Internal	No response provided
Lack of adaption of advancement in technology/ manufacturer's reluctance to change	3.3	10	70	16.7	Internal	No response provided
Cost of eco-friendly packaging	-	10	60	30	Internal	High financial implications
The pressure of lower prices	3.3	10	76.7	10	External	Drive to reduce costs
Low return on investment	3.3	6.7	70	20	Internal	Not practised
Lack of IT	6.7	6.7	63.3	23.3	External	No response provided

Lack of demand and public awareness	6.7	6.7	70	16.7	External	No response provided
Too complex to implement	3.3	3.3	80	13.3	Internal	No response provided
Lack of technological infrastructure	3.3	3.3	56.7	36.7	Internal	Require new equipment
Poor supplier commitment	6.7	3.3	56.7	33.3	External	No response provided
Not willing to change trade information	6.7	3.3	63.3	26.7	Internal	No response provided
Inappropriate organisational structure	3.3	-	70	26.7	Internal	No response provided
Inhibits innovation	6.7	-	60	33.3	Internal	No response provided
Lack of ethical standards and corporate social responsibility	6.7	-	60	33.3	Internal	No response provided
Competition and uncertainty	6.7	-	76.7	16.7	External	No response provided

5.4.1 Internal barriers impacting GSCM at CIPLA Medpro Manufacturing

More than a third of the respondents (36.7%) identified that high cost negatively impacts GSCM. This was the most significant factor identified by respondents, which indicates that respondents are most concerned with the impact of GSCM on the organisation's profit margins, which is aligned with the assertions of Faisal et al. (2021), Feng et al. (2022), Palit et al. (2022) and Sharma et al. (2023) who indicate that sustainable initiatives such as GSCM have high initial investment costs. However, Epstein et al. (2018) and Quon and Jiang (2023) and Sgroi et al. (2018) assert that financial benefits and cost savings over time increase, which creates improved profit margins. Half of the respondents indicated that high costs potentially affect GSCM, which suggests that 86.7% of the respondents identified that cost impacts the adoption of GSCM. Some of the motivations for this were that CIPLA Medpro Manufacturing lacked the funds (one respondent), that it would negatively affect the company's profit margins (one respondent) and that the costs were too high (one respondent). Less than a fifth of the respondents (13.3%) stated that cost was not a barrier to GSCM. It is evident that the perceptions of the majority of the respondents align with the high costs associated with GSCM initiatives, which is an area of concern as GSCM ultimately drives better financial performance, as noted by Epstein et al. (2018), Quon and Jiang (2023) and Sgroi et al. (2018). More awareness of the benefits associated with GSCM initiatives is necessary within the Logistics Department at CIPLA Medpro Manufacturing.

Thirty percent of the respondents stated that a lack of training is a factor that negatively impacts GSCM at CIPLA South Africa, which is a high response rate and has been highlighted as a recurring theme throughout the survey. The motivation provided by one respondent is that no training was provided by CIPLA Medpro Manufacturing, which is concerning as the logistics team is responsible for the implementation of GSCM initiatives, which is aligned with the assertions by Brogi et al. (2022), Rodríguez-Espíndola et al. (2022) and Yusliza et al. (2020) who indicate that training is critical to the success of GSCM initiatives. More than a third of the respondents (36.7%) indicated that they were unsure of the impact that this factor would have on GSCM. This indicates that 66.7% of the respondents perceive that the lack of training is a barrier to GSCM initiatives, which is supported by the internal stakeholder theory that suggests that a lack of employee awareness and knowledge of initiatives hinder an organisation's performance, as noted by Brogi et al. (2022) and Rodríguez-Espíndola et al. (2022). Thirty percent of the respondents stated that they do not believe that a lack of training affects GSCM at CIPLA Medpro Manufacturing, however, this has not been the finding throughout this study as a lack of training has been identified as one of the key concerns at CIPLA Medpro Manufacturing. Another concern that arises from this finding is that it suggests that a number of logistics staff members do not perceive a lack of training as an area of concern even though they are the team that is charged with the rollout of this sustainable practice. One respondent did not respond to this question.

A lack of understanding of green buying was stated to be a contributing negative factor to the implementation of GSCM practices by 26.7% of the respondents. This is the third most prevalent barrier identified by respondents and is reflective of the theme of a lack of knowledge of GSCM practices, which was highlighted throughout. Half of the respondents stated that it may be a potential barrier, this suggests that 76.7% of the respondents perceive that a lack of understanding of green buying has some negative impact on GSCM practices, which is aligned with the insights of Brogi et al. (2022) who indicate a lack of awareness and knowledge is a barrier to business initiatives. The motivation provided by one respondent was poor awareness by the procurement department. Twenty percent of the respondents stated that this factor did not impact GSCM at CIPLA South Africa. The lack of knowledge of this GSCM initiative is an area of concern, according to Elbarky et al. (2023), Galeazzo et al. (2021), Ivanova (2020) and Khan et al. (2023), who highlight the importance of green procurement within an organisation. Potential cost savings and reduction in environmental damage are two of the main benefits that this GSCM initiative creates within an organisation, according to Galeazzo et al. (2021) and Khan et al. (2023). This indicates that there is a need for training in this GSCM initiative within CIPLA Medpro Manufacturing.

More than a quarter of the respondents (26.7%) stated that a lack of skilled human resources is a barrier that negatively impacts GSCM at CIPLA Medpro Manufacturing. This is validated by respondents' answers throughout the survey that highlight the lack of knowledge of GSCM by the Logistics Department at CIPLA Medpro Manufacturing. The motivation for this factor was that a lack of training by the company (one respondent) and that it was not a core competency for the organisation (one respondent). Less than half of the respondents (46.7%) indicated that they are unsure if this factor impacts GSCM at CIPLA Medpro Manufacturing. This is highlighted as a concern in the internal stakeholder theory by Brogi et al. (2022), Govindan et al. (2017), Stocker et al. (2020) and Tiwari (2022), who indicate that the scarcity of skilled resources impacts the implementation and success of GSCM initiatives. This lack of skilled human resources also negatively impacts the risk identification theory, as noted by Ali et al. (2023), Maskrey et al. (2023) and Zouari-Hadiji (2023), who highlight that awareness and knowledge are critical to understanding potential risks that could negatively impact business initiatives. More than a fifth of the respondents (23.3%) stated that this was not a barrier to GSCM, which is less than the respondents who identified a lack of skilled human resources as a barrier (26.7%). This factor is most likely a barrier impacting GSCM at CIPLA Medpro Manufacturing. One respondent did not respond to this question.

A lack of understanding by supply chain stakeholders was identified as a negative barrier impacting GSCM at CIPLA Medpro Manufacturing by 13.3% of the respondents, with an equal proportion of respondents (13.3%) stating that this factor does not impact GSCM at CIPLA Medpro Manufacturing. Two-thirds of the respondents (66.7%) stated that this factor could impact GSCM at CIPLA Medpro Manufacturing, but they were unsure, which makes this question inconclusive, given the equal split of respondents supporting and against this factor as a barrier to GSCM. This is an unusual finding as more than a quarter of the respondents (26.7%) indicated that a lack of skilled human resources negatively impacts GSCM initiatives. Employees form a part of the supply chain’s stakeholders, which most likely indicates that respondents were unsure of the term supply chain stakeholders. Stakeholder involvement is critical in driving the success of GSCM initiatives, according to Brogi et al. (2022) and Stahl et al. (2020). Insights by Stocker et al. (2020) further emphasise the importance of stakeholder awareness by stating that a lack of understanding and support by organisational stakeholders will underutilise core resources that are necessary for the implementation of GSCM initiatives. It is also important to note that this is aligned with the internal stakeholder theory with the inclusion of external stakeholders. Two respondents did not respond to the question.

The trade-off between cost reduction and environmental damage was stated to negatively impact GSCM at CIPLA Medpro Manufacturing by 10% of the respondents. This suggests that these respondents perceive that to reduce costs, the environmental damage would increase. However, this goes against the insights of Galeazzo et al. (2021) and Synoracki (2019), who identify that GSCM practices reduce costs and improve environmental performance. It is important to note that respondents could be reflecting on the initial investment costs associated with GSCM initiatives, as noted by Feng et al. (2022), Golinska and Sethanan (2023), Palit et al. (2022) and Sharma et al. (2023). More than half of the respondents (63.3%) stated that this factor may negatively affect GSCM at CIPLA Medpro Manufacturing, which suggests a lack of knowledge of this factor. A trend has been that respondents are unsure of the impact of a number of the mentioned barriers, which highlights the theme of a lack of understanding by Logistics Department staff and is an area of concern according to the risk identification theory, as noted by Ali et al. (2023), Maskrey et al. (2023) and Zouari-Hadiji (2023). More than a fifth of the respondents (23.3%) stated that this factor does not affect GSCM, which is aligned with the insights of Galeazzo et al. (2021) and Synoracki (2019), which indicates a positive relationship between GSCM practices and cost reductions. One respondent did not respond to this question.

Ten percent of the respondents perceived that a lack of management commitment negatively impacts GSCM initiatives. This is supported by Routt (2021), who argues that business leaders and investors must commit to the adoption and maintenance of sustainable initiatives for sustainable development to be realised. The internal stakeholder theory also supports these respondents' perceptions, as Rodríguez-Espíndola et al. (2022) and Tiwari (2022) highlight that both a top-down and bottom-up approaches are necessary for an initiative to be successful. Almost half of the respondents (46.7%) stated that this factor may impact GSCM, however, this suggests that a large number of respondents do not fully understand this factor. This highlights the theme of a lack of knowledge by the logistics team at CIPLA Medpro

Manufacturing. Forty percent of the respondents stated that this factor does not impact GSCM at CIPLA Medpro Manufacturing. This suggests that this factor is most likely not a barrier to GSCM due to the number of responses identifying it as a barrier (10%) as opposed to those indicating that it is not (40%). One respondent did not respond to this question.

The lack of adaption to advancements in technology was indicated to be a barrier to the implementation of GSCM by 10% of the respondents. This is aligned with the assertions of Du et al. (2019), Fujii and Managi (2019), Ghisetti and Quatraro (2017), Jiakui et al. (2023) and Yin et al. (2023), who identify that green technologies are a driver of GSCM. Seventy percent of the respondents identified that this factor may impact GSCM at CIPLA Medpro Manufacturing, which indicates that the majority of the respondents do not understand this factor, which is a key area of concern as noted by Yin et al. (2023), as green technologies are enablers of sustainable initiatives. Less than a fifth of the respondents (16.7%) indicated that poor adoption of green technologies does not impact GSCM at CIPLA Medpro Manufacturing. Based on responses (10% for barrier and 16.7% for not a barrier), it could be suggested that this factor is not a barrier to GSCM at CIPLA Medpro Manufacturing. However, it is important to note that this is not a conclusive result as almost two-thirds of the respondents were unsure if this factor is a barrier, which highlights the lack of awareness and knowledge amongst the staff at CIPLA Medpro Manufacturing. One respondent did not respond to this question.

Ten percent of the respondents indicated that the high cost of eco-friendly packaging was a barrier to the implementation of GSCM initiatives. This is aligned with the insights of Sweeney (2020), who highlights the cost investment of GSCM initiatives as being a potential barrier. The motivation behind the identification of this factor being a barrier to implementation was that it had high financial implications for CIPLA Medpro Manufacturing (one respondent). Sixty percent of the respondents stated that this may be a factor impacting GSCM, but these respondents are unsure, which suggests that they cannot determine that there is a relationship between these two elements. Thirty percent of the respondents stated that this factor does not impact GSCM at CIPLA Medpro Manufacturing. This indicates that the cost of eco-friendly packing materials is likely not a barrier to GSCM initiatives for CIPLA Medpro Manufacturing. Due to the limitations discussed by the key informant as well as responses in the survey on packaging requirements, it is evident that not all packaging material can be substituted for environmentally-friendly options. Therefore, it is less likely to be a cost-related issue and more likely related to product requirements and limitations in packaging options.

A low return on investment was identified as having a negative impact on GSCM at CIPLA Medpro Manufacturing by 6.7% of the respondents, the motivation behind this was that it was not practised by CIPLA Medpro Manufacturing. This goes against the assertions of Galeazzo et al. (2021), Du et al. (2019), Routt (2021) and Wang et al. (2023) who highlight that GSCM and sustainable initiatives have a high return on investment. Seventy percent of the respondents stated that this factor could possibly impact GSCM at CIPLA Medpro Manufacturing. This trend of a lack of knowledge on impacting factors on GSCM is a recurring trend. Twenty percent of the respondents felt that this initiative does not impact GSCM initiatives at CIPLA Medpro Manufacturing, suggesting that this factor is most likely not a barrier to the implementation of GSCM initiatives, which is aligned with the assertions of Wang et al. (2023) Galeazzo et al. (2021) and Du et al. (2019) that GSCM initiatives improve an organisations profitability substantially over a long period of time. One respondent did not respond to the question.

One respondent indicated that the complexity of GSCM initiatives is a barrier to GSCM, which is aligned with the perceptions of Banihani (2023) and Everson et al. (2023) that indicate that pharmaceutical supply chains are complex, which could impact the implementation of GSCM initiatives. Eighty percent of the respondents indicated that they are unsure if the complexity of GSCM negatively impacts the implementation of this initiative. This suggests that this impact is misunderstood by most of the logistics team at CIPLA Medpro Manufacturing, which is an area of concern as the Logistics Department is currently involved with a number of GSCM initiatives as indicated by previous survey responses as well as insights by the key informant. Less than a fifth of the respondents (13.3%) stated that this factor does not impact GSCM at CIPLA Medpro Manufacturing, which was opposed by one respondent who felt that this factor most likely does impact GSCM negatively at CIPLA Medpro Manufacturing. However, the lack of knowledge identified by 80% of the respondents makes it difficult to identify the impact of this factor on GSCM. One respondent did not respond to this question.

A lack of technological infrastructure was indicated to be a negative factor impacting the implementation of GSCM initiatives by one respondent. The motivation provided by this respondent was that CIPLA Medpro Manufacturing has outdated equipment. However, the response rate is too low to validate this perception. More than half of the respondents (56.7%) stated that this factor may impact GSCM at CIPLA Medpro Manufacturing, which indicates a lack of certainty about the impact of poor technological infrastructure by staff members in the

Logistics Department at CIPLA Medpro Manufacturing. More than a third of the respondents (36.7%) stated that this factor is not a barrier to GSCM, which indicates that CIPLA Medpro Manufacturing most likely has the up-to-date infrastructure to support GSCM initiatives. This is a positive finding, as noted by the assertions of Barbieri et al. (2020), Jiakui et al. (2023) and Yin et al. (2023), who indicate that the use of green technologies is a driver of GSCM. One respondent did not respond to this question.

One respondent felt that the lack of willingness to change trade information was a factor that negatively impacted the implementation of GSCM at CIPLA Medpro Manufacturing. This is relatively low when compared to the respondents who perceive that this factor is not a barrier to GSCM (26.7%). This highlights that this is most likely not a negative factor impacting GSCM at CIPLA Medpro Manufacturing. This goes against the insights of Chourasiya et al. (2023), Negash et al. (2023) and Scown et al. (2020), who highlight that factors that impact an organisation's competitive advantage can potentially be barriers to the adoption of GSCM initiatives, as it directly impacts business performance. More than half of the respondents (63.3%) indicated that this may be a barrier but are unsure of the impact, further supporting the theme of a lack of knowledge by the company’s logistics staff members. Two respondents did not respond to this question.

No respondents identified an inappropriate organisational structure as a barrier to GSCM initiatives. This suggests that CIPLA Medpro Manufacturing has an organisational structure that supports GSCM initiatives, which was also validated by the key informant. This is critical to the successful implementation and adoption of GSCM initiatives, as noted by the assertions of Altunay et al. (2021), Knoppen and Knight (2022), Liu et al. (2023) and Ingstrup et al. (2021), who highlight the importance of alignment of organisational structure to sustainable initiatives. Seventy percent of the respondents stated that an inappropriate organisational structure may negatively affect GSCM practices at CIPLA Medpro Manufacturing, which highlights a lack of knowledge of GSCM practices by respondents. More than a quarter of the respondents (26.7%) stated that this factor did not impact GSCM practices at CIPLA Medpro Manufacturing, which suggests that they do not perceive this to be an issue within CIPLA Medpro Manufacturing. One respondent did not respond to this question.

No respondents identified the inhibition of innovation as a barrier to the adoption of GSCM initiatives. More than half of the respondents (60%) indicated that they are unsure if GSCM inhibits innovation, which highlights the theme of a lack of knowledge by the Logistics Department staff at CIPLA Medpro Manufacturing on both GSCM and the factors impacting this sustainable practice. A third of the respondents (33.3%) stated that this factor is not a barrier to GSCM, which is aligned with the insights of Seman et al. (2019) and Ghisetti and Quatraro (2017), who indicate that sustainable initiatives such as GSCM improve innovation within an organisation rather than inhibiting it. This further emphasises that this factor is not a negative factor impacting GSCM at CIPLA Medpro Manufacturing. This is an important finding as innovation is a core element of the pharmaceutical industry, as noted by Hassan and Daud (2017), Hraiga et al. (2023) and Wang et al. (2023). Two respondents did not respond to this question.

No respondents identified a lack of ethical standards and corporate social responsibility as a barrier to GSCM initiatives. These responses are aligned with the sentiments of the key informant, who identified a number of GSCM initiatives that are currently being implemented within the organisation. Sixty percent of the respondents stated that they are unsure if a lack of ethical standards and corporate social responsibility impacts the implementation of GSCM at CIPLA Medpro Manufacturing. This indicates that these respondents have a lack of knowledge of this factor, which is a core area of concern, as noted by the assertions of Freze et al. (2023) and Hermundsdottir and Aspelund (2021), who indicate that ethical standards and corporate social responsibility are drivers of sustainable initiatives such as GSCM. A third of the respondents (33.3%) indicated that this is not a barrier to the implementation of GSCM at CIPLA Medpro Manufacturing, which aligns with previous responses. Based on respondents' responses this factor is not a barrier to GSCM at CIPLA Medpro Manufacturing, however, it is important to note that more than half of the respondents stated that it might have an impact, which indicates that responses may be different if they were more aware. Two respondents did not respond to this question.

5.4.2 External barriers impacting GSCM at CIPLA Medpro Manufacturing

Four respondents (13.3%) stated that a lack of government support is a negative barrier impacting the implementation of GSCM at CIPLA Medpro Manufacturing, which is greater than the number of responses that identified that it is not a contributing barrier (10%). One respondent stated that the government lacked a proper enforcement policy, which was also highlighted by the key informant. This is aligned with respondents' responses in previous questions that highlighted that the government should be more involved with driving GSCM initiatives. Respondents' perceptions are supported by the assertions of Kim et al. (2023), Pramudana et al. (2023), Ranieri et al. (2018) and Zighan et al. (2023) who state that government policies and regulations are critical in the adoption of GSCM initiatives and a lack of government intervention reduces the organisational focus on sustainable initiatives. More than two-thirds of the respondents (73.3%) stated that the lack of government support may impact the implementation of GSCM at CIPLA Medpro Manufacturing, which again highlights the lack of understanding by respondents on the impact of government support. One respondent did not respond to this question.

Lack of awareness in society was identified as a negative factor affecting GSCM at CIPLA Medpro Manufacturing by 13.3% of the respondents. This is slightly less than the responses indicating that this factor is not a barrier that impacts GSCM (16.7%). More than half of the respondents (63.3%) stated that this factor might impact GSCM at CIPLA Medpro Manufacturing. This indicates that the lack of knowledge by staff members impacts the results of factors impacting GSCM at CIPLA Medpro Manufacturing. Therefore it is difficult to determine if this factor is a barrier to GSCM. The lack of awareness is an area of concern as noted by Chen et al. (2021), De Fine Licht and Folland (2019), Karbassi (2021), Madanaguli et al. (2022) and Sainati et al. (2023) who state that a lack of awareness by society negatively impacts the adoption of sustainable initiatives as it reduces the importance of sustainable initiatives to society, and thus, serves as an insufficient incentive to promote GSCM initiatives to businesses.

A lack of knowledge and experience by suppliers was stated to have a negative impact on GSCM at CIPLA Medpro Manufacturing by 13.3% of the respondents, while 16.7% of the respondents stated that this factor does not impact GSCM. The motivation provided by a respondent was that no training was provided to suppliers. More than half of the respondents (63.3%) indicated that this might impact GSCM at CIPLA Medpro Manufacturing, which highlights a lack of knowledge on the impact of this factor. Two respondents did not respond to this question. The knowledge that suppliers have on the GSCM initiatives is critical to business operations, as noted by Chakraborty et al. (2023), Karmaker et al. (2023), Park et al. (2022), Prabhu, et al. (2020) and Skalli et al. (2023), who identify that suppliers support business strategies and, therefore, must be integrated into business initiatives such as GSCM.

The pressure for lower prices was identified as a barrier affecting GSCM at CIPLA Medpro Manufacturing by 10% of the respondents. The motivation for this factor being a barrier to GSCM was that CIPLA Medpro Manufacturing is focused on driving down costs, according to one respondent. This goes against the assertions of Galeazzo et al. (2021) and Sweeney (2020), who assert that GSCM actually reduces costs, suggesting that lower costs should be the driver rather than a barrier. However, it is important to note that cost was identified as a barrier to GSCM due to financial investment costs, which could also increase the price of a product, as noted by Feng et al. (2022), Palit et al. (2022), Rahman et al. (2020) and Sharma et al. (2023). According to the key informant, CIPLA Medpro Manufacturing is strategically aligned to providing affordable education, which makes the organisation highly price sensitive. Ten percent of the respondents stated that this factor is not a barrier to GSCM, which is aligned with the sentiments of the key informant, who indicated that sustainable initiatives can reduce the cost price of a product, which may reduce the price. More than two-thirds of the respondents (76.7%) indicated that they are not sure of the impact this factor has on GSCM, which is a recurring theme in this survey. One respondent did not respond to this question.

The lack of IT was identified by two respondents as a factor that negatively impacts GSCM at CIPLA Medpro Manufacturing, however, 23.3% of the respondents argued that this was not a barrier to GSCM. According to Barbieri et al. (2020), Du et al. (2019) and Yin et al. (2023), the use of technology enables improved sustainable performance. However, respondents could be alluding to the perception that CIPLA Medpro Manufacturing has updated IT that supports GSCM. More than half of the respondents (63.3%) stated that they are unsure if this factor negatively impacts GSCM at CIPLA Medpro Manufacturing and further indicated that there was a lack of knowledge. Two respondents did not respond to this question. This question was poorly formulated as it is ambiguous and intended to probe whether the lack of new and innovative technology within the industry was a barrier to GSCM.

A lack of demand and public awareness was stated to be a negative factor impacting GSCM at CIPLA Medpro Manufacturing by two of the respondents, while 16.7% of the respondents indicated that it was not a barrier. According to Abdel-Baset et al. (2019), Carvalho and Sousa (2018) and Sainati et al. (2023), public awareness is a core driver of GSCM and is increasing among consumers across all industries, which validates respondents' responses that the lack of public awareness is a negative factor impacting GSCM. Seventy percent of the respondents stated that they were not sure if this factor was a barrier. This highlights the prevalence of a lack of knowledge by CIPLA Medpro Manufacturing staff on GSCM. Two respondents did not respond to this question.

Poor supplier commitment was identified as a negative factor impacting the implementation of GSCM by one respondent. A third of the respondents (33.3%) stated that this factor does not impact GSCM at CIPLA Medpro Manufacturing, which indicates that it is most likely not a barrier to GSCM. This also suggests that CIPLA Medpro Manufacturing suppliers are involved in GSCM initiatives, as they are committed to supporting/ achieving GSCM initiatives within the organisation. Two respondents did not respond to this question. Some respondents' responses go against the sentiments of Chourasiya et al. (2023), Negash et al. (2023), Park et al. (2022) and Pramudana et al. (2023), who assert that supplier commitment is critical to the success of GSCM initiatives. According to Liu et al. (2021), the support of suppliers drives business performance and, therefore, lays the foundation for business strategies. This could also indicate that CIPLA Medpro Manufacturings suppliers are committed and, therefore, respondents do not perceive it to be a barrier. More than half of the respondents (56.7%) stated that poor supplier commitment may impact GSCM. This could be attributed to the prevalent lack of knowledge by respondents on the factors impacting GSCM at CIPLA Medpro Manufacturing. This is an area of concern as it indicates that respondents do not understand the role that suppliers fulfil within GSCM initiatives and, therefore, highlights the importance of training on the various role players within green initiatives.

More than two-thirds of the respondents (76.7%) stated that they are unsure if uncertainty and competition are negative factors impacting GSCM at CIPLA Medpro Manufacturing. Less than a fifth of the respondents (16.7%) stated that this factor is not a barrier to GSCM, with no responses indicating that this factor does impact the implementation of GSCM, which opposes the insights of Handfield (2020), Healy et al. (2019) and Sharabati (2021) who indicate that competition and uncertainty directly impact GSCM initiatives and can be either a driver or barrier. According to Courtnell (2019), it is essential for an organisation to focus on economic sustainability. This would suggest that respondents are not feeling the pressure of competition at CIPLA Medpro Manufacturing. Therefore, this factor was not identified as a barrier to GSCM at CIPLA Medpro Manufacturing. Two respondents did not respond to this question.

The most significant barriers to the implementation of GSCM at CIPLA South Africa, according to respondents, were high cost (36.7%), lack of understanding to incorporate green buying (26.7%), lack of training (30%), and the lack of skilled human resources in the implementation of GSCM (26.7%). These barriers identified by respondents are closely aligned with information from the key informant and the insights that have been gathered by respondents' responses to previous questions. Respondent's perceptions are aligned with the assertions of Faisal et al. (2021), Feng et al. (2022), Palit et al. (2022), Sharma et al. (2023) and Sweeney (2020), who state that there are initial costs that are associated with the adoption of sustainable initiatives. This validates respondents' responses, however, it is also important to note that Sweeney (2020) also indicates that these costs are recuperated from savings and efficiencies that are associated with GSCM initiatives. A lack of skilled human resources and training have been recurring themes associated with the results and serves as a strong barrier for the adoption of GSCM initiatives, supporting assertions by Cheema et al. (2020). Neirotti (2020) states that employee involvement is critical to the success of GSCM initiatives and, therefore, they are core role players. If employees have a lack of knowledge or training, it would directly negatively impact GSCM initiatives. This is also a concern based on the internal stakeholder theory, which indicates that employee awareness is key to the success of any initiative that a business implements, as noted by Brogi et al. (2022), Rahardja (2023) and Rodríguez-Espíndola et al. (2022).

The factors that impacted GSCM implementation the least, according to respondents, were lack of management commitment (40%), lack of technological infrastructure (36.7%), its impact on inhibiting innovation (33.3%), poor supplier commitment (33.3%) and the lack of ethical standards and corporate social responsibility (33.3%). It is evident from respondents' responses that CIPLA Medpro Manufacturing supports GSCM initiatives and upholds ethical behaviour. It is indicated that suppliers and infrastructure do not inhibit the adoption of GSCM initiatives, which highlights that the barriers to GSCM at CIPLA Medpro Manufacturing are related to training and costs as opposed to culture and stakeholder support.

5.5 Conclusion

This Chapter presented the analysis of the data that was collected from the surveys and the key informant interview. The results were discussed with the use of relevant literature to provide deeper insights into the findings. There were instances where there were variances between the survey results and the literature reviewed. The findings were also considered against the theoretical frameworks of the sustainable development theory, green logistics theory, risk identification theory and internal stakeholder theory.

It was also evident that the attitudes, perceptions, knowledge and insights from the green logistics team were critical in understanding the barriers that impact green logistics at CIPLA Medpro Manufacturing. The findings reveal that employment, financial performance and corruption were the most prominent factors facing business currently, whilst education, personal health and employment were the most pertinent factors for society. It was evident that government intervention was key in the adoption of GSCM initiatives such as green logistics and was a necessity in the promotion of this initiative within the pharmaceutical industry.

The most pertinent barriers to the adoption of green logistics were identified as high costs, a lack of understanding of initiatives, a lack of skilled human resources and a lack of training. The lack of knowledge, in general, was a recurring theme amongst respondents and is highlighted in three of the four most significant barriers to green logistics. Chapter Six provides the summary and the recommendations emanating from this research endeavour.

CHAPTER SIX: SUMMARY OF RESULTS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

It was identified that CIPLA Medpro Manufacturing has multiple initiatives in place to support GSCM within the organisation. However, a number of the GSCM initiatives that were identified were not always conducted by CIPLA Medpro Manufacturing. This suggests that most GSCM initiatives in CIPLA Medpro Manufacturing are not monitored to ensure compliance. According to Cousins et al. (2019) and Kähkönen et al. (2023), it is critical for organisations to regularly monitor their GSCM initiatives to ensure their success. Staff perceptions were also supportive of sustainable initiatives in both personal and working environments, which indicates that employees within the Department support these initiatives to some degree. It was identified that although a number of employees support sustainable initiatives, they also had preferences as to which they supported and which they preferred not to conduct, in both a personal and work capacity. A number of issues served as barriers to the adoption of a number of sustainable initiatives, which effectively skewed respondents' perceptions of certain sustainable practices. Various internal and external barriers were also identified by respondents that impacted the adoption of sustainable practices both at work and at home. Although a large number of barriers were identified, respondents were able to indicate which barriers they perceived to be the most detrimental to the adoption of sustainable initiatives. The countermeasures put in place at CIPLA Medpro Manufacturing to combat barriers to green logistics and GSCM were also identified. The effectiveness of these countermeasures was also evaluated by staff members to identify their effectiveness. Respondents also made personal suggestions for potential countermeasures to be used by CIPLA Medpro Manufacturing to better combat the barriers to sustainability at the company. This Chapter provides a summary of the key research findings. Thereafter, recommendations derived from the study are forwarded. Finally, concluding remarks are made.

6.2 Overview of chapters

Chapter One introduced the topic and provided the motivation for the study, the aim, and the objectives. Furthermore, a brief overview of the theoretical framework and the methodology used was provided.

Chapter Two provided a review of existing literature that covered issues such as the impact of climate change, the internal and external barriers that affect green logistics and GSCM, the pillars of sustainability, the impact of supply chains on sustainable development, drivers impacting GSCM and the impact of the pharmaceutical industry on sustainability. From the literature reviewed, it is evident that pharmaceutical supply chains significantly impact the various pillars of sustainability both locally and globally.

Chapter Three provided the relevant conceptual and theoretical contexts that focused on the barriers to green logistics, sustainability models within the pharmaceutical sector, the importance of sustainability in the industry and the various elements of sustainability. Consequentially, the Logistics Department within the pharmaceutical industry is evidently a critical driver of sustainable initiatives and is directly involved with sustainable development within the pharmaceutical sector.

Chapter Four defined the research methodologies and approaches used. This included the use of both quantitative and qualitative data that were collected through the use of questionnaires and a key informant interview. The data collection tools were implemented through both face-to-face and online submissions to ensure the highest possible response rate.

Chapter Five presents and analyses/ interprets the primary data collected. Statistical analyses were conducted through the use of SPSS to undertake a descriptive analysis of the survey findings. Tables and figures were generated to highlight key results and learnings from the research. The key informant responses were integrated into the discussion thematically. The findings were also integrated with relevant existing literature on green logistics and sustainability to support or challenge findings.

Chapter Six concludes the study with a summary of the main points and findings of this research, an explanation of the findings of the research and the inferences of the findings of the study on the current bodies of knowledge and recommendations for future research.

6.3 Summary of key research findings

The main research findings of the study are summarised in relation to the objectives identified in Chapter One. The summary indicates that the objective was achieved and the research questions that preceded the objectives were addressed.

6.3.1 Employees' perceptions of sustainability in a personal capacity

In a personal capacity, most respondents indicated that education, health and employment were the most critical elements facing society currently. Environmental concerns were identified as one of the least important factors impacting society. This suggests that environmental concerns are perceived to not be an area of concern for society in light of other impacting factors. This correlates with the insights of Elneel et al. (2023), Liszbinski et al. (2023), Sauls (2020) and Stahl et al. (2020), who state that factors other than environmental concerns can have a deeper impact on society. This is further emphasised by the high unemployment rate in South Africa, which places a strain on the basic needs of society. This sentiment was further emphasised when respondents identified the core issues impacting them currently, as poverty received the highest response rate. This motivates the impact of the high levels of poverty in South Africa. This is also motivated by Hale et al. (2019), Hopper (2020) and Nomafu et al. (2023), who state that individuals must meet their individual needs before those of society and the world. This indicates that poverty is the most impactful barrier to sustainable initiatives facing respondents.

Some of the respondents also stated that they are directly impacted by land pollution, hazardous waste, water pollution, air pollution and traffic congestion. This indicates that respondents are negatively impacted by the by-products of poor environmental performance. According to the respondents, the most prevalent causes of climate change are emissions from industry, deforestation and emissions generated from fossil fuels. This is most likely attributed to the factors impacting climate change, as CIPLA Medpro Manufacturing is located in an industrial area alongside a number of manufacturing factories. CIPLA Medpro Manufacturing is also located in a high-traffic area in Mobeni, KwaZulu-Natal, which also highlights respondents' responses that vehicle emissions are a factor impacting climate change.

An important insight gained was that the majority of the respondents did not know what was meant by green logistics even though they are currently employed within the Logistics Department. This suggests that there is a lack of knowledge of GSCM initiatives within the Logistics Department at CIPLA Medpro Manufacturing. This is concerning since, according to Brogi et al. (2022), Maskrey et al. (2023) and Zouari-Hadiji (2023), a lack of knowledge could directly impact the implementation and success of GSCM initiatives such as green logistics. If employees are unaware of this sustainable initiative it would be difficult to implement it within the organisation. This was further emphasised by the majority of the respondents not understanding the impact of climate change on CIPLA Medpro Manufacturing. It is evident that although respondents understand the impact of climate change and poor environmental performance in their personal lives, they lack the knowledge of poor environmental performance and climate change on an organisation. The theme of a lack of knowledge on GSCM and sustainability within a business context recurred throughout the study, which emphasised the importance of proper training on the importance and impact of these sustainable initiatives within the organisation.

6.3.2 The GSCM and green logistics practices conducted by CIPLA Medpro Manufacturing

The key informant interview focused on identifying the current GSCM and green logistics processes that are currently undertaken by CIPLA Medpro Manufacturing. This was also supplemented with data provided by the survey to develop a holistic view of sustainable initiatives adopted by the supply chain department in CIPLA Medpro Manufacturing.

The first practice identified was that of recycling various materials through the use of recycling bins. According to Pan et al. (2019) and Suhandi and Chen (2023), this sustainable practice is the basis for a circular economy, which suggests that CIPLA Medpro Manufacturing has adopted a fundamental GSCM practice. However, it was important to note that the key informant identified that some materials were not recyclable and had to be disposed of, such as foils used in the packaging of products. This was also supported by data from the surveys which identified that recycling was not always conducted. This highlights that although CIPLA Medpro Manufacturing is currently utilising recycling as a GSCM practice, it could still be developed to change its packaging materials. However, this suggestion would have to be looked at by their research and development department to identify potential alternatives and to ascertain whether it would be a viable option. The proper disposal of waste was identified as a prevalent GSCM practice conducted at CIPLA Medpro Manufacturing. However, it was identified that not all pharmaceutical waste can be easily disposed of, due to the nature of the materials used in the production process. Certain hazardous materials can only be disposed of through the use of an incinerator, which is located in Olifansfontein and, therefore, requires the transportation of waste materials over a distance of six hundred kilometres. It is evident that having a waste disposal plant closer to the manufacturing plant would be highly beneficial to CIPLA Medpro Manufacturing to reduce costs from transportation as well as to reduce the overall environmental impact. Some materials are disposed of using an external waste disposal company that collects highly hazardous materials weekly to be sludged as CIPLA Medpro Manufacturing does not have the equipment required to conduct this waste disposal procedure. This would suggest that CIPLA Medpro Manufacturing loses sight of its highly hazardous by-products, which raises the question of the total impact of pharmaceutical production at CIPLA Medpro Manufacturing. The key informant identified that they could not disclose the name of their private waste disposal company for confidentiality purposes, however, a potential field of study would be to analyse the effectiveness of waste companies in South Africa to determine the total impact of pharmaceutical products on the environment.

The reduction of electricity usage was also identified as a core GSCM initiative conducted by CIPLA Medpro Manufacturing. This practice was enabled through the use of usage metres and weekly reporting on electricity usage per department. However, CIPLA Medpro Manufacturing relies strongly on the power grid for its electricity, which promotes the use of the burning of coal to generate electricity. A suggestion to CIPLA Medpro Manufacturing would be to make use of alternative sources of power, such as solar power. This would reduce the reliance of CIPLA Medpro Manufacturing on the power grid to both reduce costs and improve environmental performance.

CIPLA Medpro Manufacturing also promotes the reuse of materials throughout the organisation. According to Suhandi and Chen (2023), reuse is an essential tool in the creation of a circular economy, however, Barrett et al. (2020) identify that the reuse of materials is not always an option. This was identified during both the key informant interview and the surveys, in which respondents suggested that reuse was not always possible due to the sensitivity of the products used in CIPLA Medpro Manufacturings manufacturing processes. Some materials had to be disposed of if damaged or compromised to ensure that product quality would be upheld.

6.3.3 External barriers facing GSCM at CIPLA Medpro Manufacturing

The barriers to GSCM have been separated into two fields, namely internal and external barriers, as identified in the research questions. The motivation behind this is to determine which barriers can be controlled within CIPLA Medpro Manufacturing and which cannot. External barriers occur outside of the business premises and are less likely to be directly controlled by an organisation.

The greatest barrier to the adoption of GSCM was identified as a lack of government support. Respondents indicated that although the South African government has policies in place, there is a lack of enforcement of these policies. This perception is supported by Sun et al. (2023), Torres-Delgado et al. (2023), Wu (2023) and Ziolo and Ghoul (2019), who state that the government is best positioned to promote the adoption of GSCM and green logistics initiatives. Although government support can be identified as a driver of GSCM, it is evident that in its absence, pharmaceutical companies are less motivated to adopt GSCM and green logistics initiatives.

The lack of awareness by society was also identified as a crucial barrier to the adoption of GSCM and green logistics initiatives by CIPLA Medpro Manufacturing. According to respondents, the lack of awareness reduces the likelihood of CIPLA Medpro Manufacturing adopting sustainable initiatives due to the investment into more perplexing issues facing society. The key informant went on to further discuss the importance of understanding society's needs in South Africa to make CIPLA Medpro Manufacturing relevant and competitive. The need for affordable medication in South Africa is exacerbated by high levels of unemployment and health issues such as HIV and AIDS, which are generally a priority for society. The lack of demand for sustainable products by South African consumers was identified as a result of the lack of awareness. This further emphasised the impact of a lack of awareness.

The pressure of lower prices was identified as another evident barrier facing the adoption of GSCM and green logistics initiatives. Due to the volatility of the South African economic climate and the rampant prevalence of unemployment, CIPLA Medpro Manufacturing is currently focused on reduced prices to ensure that it can provide the general public with affordable medication. This moves the focus away from environmental concerns and sustainable practices. A recurring theme among respondents has been the lack of knowledge on the impact of GSCM and green logistics on an organisation's cost margins. It is evident that many of the green logistics staff at CIPLA Medpro Manufacturing do not understand the cost savings associated with GSCM initiatives and the general perception is that sustainable initiatives are costly and negatively impact profit margins.

6.3.4 Internal barriers facing GSCM at CIPLA Medpro Manufacturing

Internal barriers occur within the organisation and can be directly controlled through the implementation of policies, changes to the structure and various other countermeasures. The most impactful barrier to the adoption of GSCM initiatives was identified as the high costs involved with adopting this sustainable initiative. The key informant further discussed this barrier by stating that the initial costs involved with changing current business practices to new sustainable methods served as a significant barrier as it would reduce profit margins for that financial year and perhaps years to come before the value in terms of financial gains were to be realised. Survey respondents stated that CIPLA Medpro Manufacturing lacked the funds to develop GSCM initiatives and this was the main explanation for the lack of investment in these initiatives. This highlights that to motivate top management a cost analysis must be drawn to highlight the cost-benefit over time for the implementation of GSCM initiatives such as green logistics. The second most commonly identified barrier to GSCM at CIPLA Medpro Manufacturing was identified as a lack of training on this initiative. A number of respondents did not understand the concept of GSCM or green logistics. This is concerning as it is difficult to implement an initiative that is not fully understood. During the key informant interview, it was also identified that CIPLA Medpro Manufacturing did not provide a deeper insight into the purpose of some of their green logistics initiatives to their employees. Rather the stance taken by CIPLA Medpro Manufacturing relied heavily on operational training and the reliance of staff members to be aware of GSCM and green logistics initiatives within the organisation. It was also established that the general perception amongst employees on sustainability was favourable. This suggests that the lack of training is indeed a critical barrier to the adoption of GSCM and green logistics at CIPLA Medpro Manufacturing.

The third most popular barrier was a lack of skilled human resources in the implementation of GSCM at CIPLA Medpro Manufacturing. This barrier is related to the lack of training, as it indicates that some staff members are not properly equipped to implement GSCM initiatives at CIPLA Medpro Manufacturing. This is a major concern for CIPLA Medpro Manufacturing as it indicates that the logistics staff at CIPLA Medpro Manufacturing are not properly equipped to implement the sustainable initiatives that the organisation has adopted, which will directly impact the success of these initiatives. The lack of understanding to incorporate green buying was also identified as a core barrier to the adoption of GSCM. This relates to the lack of training on GSCM initiatives within CIPLA Medpro Manufacturing. Green buying directly impacts the carbon footprint of a product and is a core contributor to a circular economy. This would overemphasise the importance of various purchasing metrics, such as cost, and undervalue the benefits associated with green buying. Therefore, the theme of a lack of knowledge on GSCM is highlighted, and the need for robust training on GSCM within the organisation is highlighted.

Respondents also highlighted that the lack of knowledge of GSCM spread across to their suppliers and other supply chain stakeholders. This suggests that GSCM and green logistics are relatively misunderstood concepts at CIPLA Medpro Manufacturing and even amongst their supply chain partners. To rectify this glaring issue throughout the supply chain at CIPLA Medpro Manufacturing, training is required for both internal staff as well as external supply chain partners.

Cost reduction at the cost of the environment was also identified as a substantial barrier to the adoption of GSCM. This suggests that CIPLA Medpro Manufacturing is willing to increase its environmental impact to reduce its costs. It was identified that the pressure for lower costs by consumers was also a core barrier to GSCM, which indicates that these two barriers are interrelated. It was identified during the key informant interview that the core value of CIPLA Medpro Manufacturing is to provide affordable medication to the South African population.

A lack of management commitment was also identified as a prevalent barrier to GSCM at CIPLA Medpro Manufacturing. During the key informant session, it was identified that CIPLA Medpro Manufacturing supports GSCM initiatives but values other elements, such as cost reduction, higher than sustainable practices. This barrier occurs from the perception that GSCM initiatives are not aligned with critical business goals such as cost reduction. This stems from the lack of knowledge of the benefits associated with GSCM initiatives, which further emphasises the importance of GSCM training within CIPLA Medpro Manufacturing. The reluctance to adapt to advancements in technology was also identified as a contributing barrier to GSCM at CIPLA Medpro Manufacturing. This is indicative that CIPLA Medpro Manufacturing has established methods of manufacturing its products and does not want to adapt to technological changes within the industry. Manufacturing practices are monitored by various regulatory bodies, which inhibit changing manufacturing methods regularly, according to the key informant. Many processes stay in place for a number of years to ensure that manufacturing procedures remain uniform. This, however, negatively impacts CIPLA Medpro Manufacturing's ability to adopt new technologies. Although a number of other barriers were identified, it was evident that respondents were unaware of the impact that they had on GSCM. As a result, barriers that were identified by less than 10% of the respondents were not identified as critical barriers to GSCM and green logistics. The omission of these barriers was to ensure that the information was reliable and generalisable.

6.4 Value of theoretical framework

The theoretical framework established the foundation of the study, which provided guidelines for the researcher to follow when establishing key research elements such as the data collection tools. The four theories that were put forth were the (1) sustainable development theory, (2) green logistics theory, (3) risk identification theory and (4) internal stakeholder theory, which provided key perceptions that guided the study.

The sustainable development theory suggests that the move towards sustainable development is critical for the future of mankind and is driven by ethical, social and ecological objectives (Chams and García-Blandón, 2019). It was also highlighted that sustainable development goals are driven by the adoption of green initiatives within the industry (Silva, 2021). The research findings clearly support this as a theme identified by the respondents was that the establishment of sustainable initiatives directly impacts social and environmental performance and the wellness of these two elements. Respondents also highlighted employee perceptions that the adoption of green logistics and GSCM initiatives would improve overall brand quality and would be important for the pharmaceutical industry.

The green logistics theory highlighted that the adoption of green logistics was crucial in driving sustainable development within an organisation and, as such, should be a core area of focus (Albuquerque et al., 2020; Tan et al., 2020). This was also identified by respondents who indicated that green logistics involved improving the environmental performance of the organisation through the Logistics Department operations. The researcher also used this definition to identify seventeen initiatives relating to green logistics, which indicates that CIPLA Medpro Manufacturing uses this method to drive sustainable development. These initiatives were easily highlighted by using the definitions provided by Albuquerque et al. (2020), Grijalvo and García-Wang (2023), Rasool et al. (2019), Silva (2021) and Tian et al. (2018) in the green logistics theory. This study highlights these green logistics initiatives for future studies within the field of green logistics within the pharmaceutical sector. An interesting finding was that green logistics initiatives can also have direct involvement in green procurement and green production and consumption and, therefore, do not relate solely to the various elements of logistics but extend beyond the borders of the department.

The risk identification theory highlighted the importance of identifying the barriers to green logistics and GSCM and the impact of these barriers on the adoption and maintenance of these initiatives. The potential threat of the failure of initiatives due to unidentified risks was highlighted by Kliem and Ludin (2019), Maina and Mungai (2023) and Sun et al. (2023). This provided further motivation for the study based on the previous theories discussed and their importance. The risks identified were highlighted as internal and external barriers that were impacting green logistics and GSCM within CIPLA Medpro Manufacturing. A total of 24 barriers were identified in the study, with 20 being identified as a definite barrier to green logistics and GSCM by at least one respondent.

The internal stakeholder theory provided the key perception that individuals such as owners, investors and employees contribute significantly towards the successful adoption and implementation of initiatives such as green logistics and GSCM, as noted by Stahl et al. (2020) and Yanez et al. (2019). This theory is tied back to the risk identification theory as it relates to the importance of internal stakeholder insights into the identification of risks impacting green logistics and GSCM. The use of theory guided the researcher to understand the perception of the logistics staff members and barriers impacting green logistics and GSCM initiatives. The focus on employee insights highlighted key themes such as the lack of knowledge and training, which severely impacts the performance of the green logistics initiatives at CIPLA Medpro Manufacturing.

6.5 Recommendations emanating from the study

This section expands on the recommendations that emanate from the study. This discussion is guided by the research objectives of the study and the findings from the survey and key informant interview.

6.5.1 Developing a culture that supports green logistics and GSCM initiatives

A number of green logistics and GSCM initiatives at CIPLA Medpro Manufacturing were identified by staff members, however, not all sustainable initiatives were conducted on a regular basis. This resulted in a number of initiatives being conducted on a casual basis. According to Brogi et al. (2022) and Tiwari (2022), a lack of proper management of sustainable initiatives is a core contributor to their failure. CIPLA Medpro Manufacturing is currently involved with a number of green logistics and GSCM initiatives, however, it was identified that none of these initiatives was always conducted by the organisation. For example, the most prevalent initiative was that of recycling, which was identified by half of the respondents, which is a strong indicator that there are poor levels of control within the organisation. The lack of a supportive culture within the organisation is reflected in the poor response rate to the various initiatives identified by the respondents and the key informant. This directly impacts the performance of green logistics and GSCM initiatives at CIPLA Medpro Manufacturing. Consequently, there is a need to develop structures within the organisation that serve as control mechanisms for green logistics and GSCM initiatives. The creation of clear lines of communication within the organisation on GSCM and green logistics initiatives that are being adopted and those that are currently being conducted within CIPLA Medpro Manufacturing is imperative. These communications should be made visible and accessible to all staff members within the organisation. The use of posters, emails and sustainability champions should be adopted within the organisation.

Posters and visual aids should be used as a medium of communication to develop awareness within the organisation of the green logistics initiatives that are currently being conducted. These posters should indicate the importance of adherence to sustainable initiatives within the organisation to improve the level of compliance within the Logistics Department at CIPLA Medpro Manufacturing. Another important benefit of posters would be to outline correct procedures otherwise known as standard operating procedures. This would serve as a reminder to staff members of the correct methods of conducting green logistics and GSCM initiatives at CIPLA Medpro Manufacturing. For example, which materials are to be recycled locally or sent off to be reused, thus improving the success rate. According to Lawson and Vaganay (2019), the adoption of posters serves as a continuous reminder of the benefits and associated repercussions of adherence to company policies and procedures, this would, therefore, improve the rate of adoption by the logistics employees at CIPLA Medpro Manufacturing. Fredj et al. (2020) state that posters and the use of other visual aids in the workplace are a necessity for the adoption of an intermodal intervention programme to change organisational behaviour. This would be an effective method of behavioural change within the organisation and the least intrusive method of raising awareness within the organisation.

Monthly emails from the management team and the human resources department as a form of direct communication is another effective and efficient method of raising awareness and promoting the adoption of GSCM initiatives. Emails stating the intent of current and future initiatives provide insight into the importance of green logistics and GSCM activities within organisations. Information about the purpose of these initiatives, standard operating procedures as guidelines and the importance of employee compliance can be disseminated to help employees better understand organisational expectations. The email system can be used to also provide a feedback mechanism to management. This would improve problem identification, clarification of roles and processes, and provide information on green logistics and GSCM initiatives on an operational level to assist with decision-making. According to Pugh et al. (2021), the use of emails provides a direct and personal communication channel to employees, which improves response to changes within an organisation. This suggests that the use of emails would have a direct impact on employee awareness and would provide a medium for two-way communication between CIPLA Medpro Manufacturing and its staff members on green logistics and GSCM initiatives.

The identification of sustainability champions would serve the purpose of driving sustainability initiatives within CIPLA Medpro Manufacturing. The benefit of sustainability champions is to improve the adoption of green logistics and GSCM initiatives within CIPLA Medpro Manufacturing and to ensure that the correct processes are followed when conducting these initiatives. The study has identified a lack of knowledge of green logistics and GSCM by logistics staff at CIPLA Medpro Manufacturing, which has been a recurring theme throughout the study. This will be addressed through the selection and training of sustainability champions. According to Chen et al. (2020), the use of champions within organisations directly impacts the adoption of initiatives that are ethical in nature but also drive high levels of business performance. Lei et al. (2018) further support the use of champions within a business context as it provides an internal view of changes, problems and potential solutions from an operational level. The use of champions at CIPLA Medpro Manufacturing would also provide insight into the success/ failure of green logistics and GSCM initiatives from an employee perspective. This would assist management in identifying potential threats and benefits to improve the performance of GSCM and green logistics initiatives at CIPLA Medpro Manufacturing. Due to the small size of the Logistics Department at CIPLA Medpro Manufacturing, one champion per site is recommended. The duties of the sustainability champion are to train staff on current and future GSCM and green logistics initiatives, and provide weekly and monthly reports to management on green logistics and GSCM initiatives conducted at CIPLA Medpro Manufacturing. These reports should identify potential threats and opportunities (including incident reports), provide suggestions based on feedback from staff members, facilitate training sessions with guest speakers, and drive and create a culture that is conducive to the success of green logistics and GSCM initiatives.

6.5.2 The development of human capital to successfully implement sustainable initiatives

The lack of knowledge by logistics staff on green logistics and GSCM initiatives was evident throughout the study. A large number of staff members indicated that they did not know what was meant by the concept of green logistics and GSCM, which is extremely concerning as they work within the Logistics Department and are charged with the implementation of these initiatives. This is supported by Palit et al. (2022) and Sharma et al. (2023) who state that knowledge is the foundation for the successful maintenance and adoption of GSCM initiatives. Therefore, a lack of knowledge would severely hinder the performance of GSCM and green logistics initiatives at CIPLA Medpro Manufacturing, which could be a result of the poor adoption/ implementation rate by logistics staff members.

The lack of knowledge was also identified throughout the survey in various other sections as well. This indicates that the lack of knowledge expands past these initiatives to sustainability as a whole. This would indicate that a significant number of logistics staff members at CIPLA Medpro Manufacturing do not have a foundational knowledge of sustainability. For CIPLA Medpro Manufacturing to develop the capacity for the adoption of sustainable initiatives at CIPLA Medpro Manufacturing, the organisation would need to develop a strategy to develop, train and nurture its employees within the Logistics Department. The recommendation to combat this barrier is a robust training programme. The programme should address three major concerns identified within the study, namely, (1) developing an understanding of sustainability on a foundational basis, (2) developing an understanding of green logistics and GSCM, and (3) training staff members on the green logistics and GSCM initiatives conducted by CIPLA Medpro Manufacturing. A three-phase project plan to address the above-mentioned concerns is suggested. The purpose of this approach is to ensure that staff members are equipped for success by developing them from a foundational phase to negate potential confusion or resistance to change.

(1) Phase I: Developing an understanding of sustainability on a foundational basis

This phase should be tasked with the development of an understanding of sustainability. As indicated by a number of staff members, they do not fully comprehend the impacts of poor sustainable performance and the need for it at CIPLA Medpro Manufacturing. The aim of this phase is to introduce staff members to the need for sustainability in society and in business. Therefore, the focus of the training programme at this stage should be on: (1) developing an understanding of core foundational concepts; (2) developing an understanding of the impact of poor environmental performance on society, businesses and the environment as a whole; (3) identifying the role of policy and legislation on sustainability within an organisation; and (4) understanding the importance of the role of businesses in sustainable development.

The method of training suggested is the use of external experts and short courses. The motivation behind this is to ensure the staff members develop an understanding of sustainability from experts as it is highly unlikely that CIPLA Medpro Manufacturing has qualified sustainability professionals within the organisation. This would be funded by the organisation but would directly impact organisational success and performance. This phase should be conducted within one to three months as it is simply to provide a foundational understanding of sustainability for the smooth implementation of phases II and III.

(2) Phase II: Developing an understanding of green logistics and GSCM

At this phase staff members within the Logistics Department would receive training on GSCM and green logistics initiatives, which is directly related to their job specification. This will build upon the first phase as it would provide a context to methods used within the discipline of supply chain management. The core purpose of this field is to develop an understanding of the various practices used within the discipline, and the benefits associated with these green logistics initiatives and to provide insight into phase III. This stage of the training programme should cover: (1) understanding the impact of supply chains on the environment and society; (2) developing an understanding of effective and efficient GSCM and green logistics practices; (3) understanding the financial, reputational and organisational implications of GSCM and green logistics; (4) understanding the impact of government legislation on GSCM and green logistics initiatives; and (5) identifying drivers and barriers to GSCM and green logistics initiatives.

The method of training suggested would be the use of external experts and short courses. The motivation for the use of external resources is to provide employees with a broader view of GSCM and green logistics initiatives to build capacity within the Logistics Department to develop current practices and drive future GSCM and green logistics initiatives. This phase should be conducted between two to four months and will provide an intermediate understanding of sustainability within the discipline of GSCM and green logistics.

(3) Phase III: Training staff members on the green logistics and GSCM initiatives conducted by CIPLA Medpro Manufacturing

This is the final phase of the training programme and is aimed at using the knowledge gained from the first two phases to facilitate an understanding of the GSCM and green logistics initiatives conducted by CIPLA Medpro Manufacturing. During this phase, the management team provides formal training sessions for logistics staff members on GSCM and green logistics initiatives conducted within the organisation. The training should not only focus on the practices used but also on the larger strategies that these initiatives are a part of, for example, cost reduction within the department. This will assist employees in understanding their contribution to sustainable development and the importance of their roles within the sustainability programme at CIPLA Medpro Manufacturing. This stage of the training programme should cover: (1) developing an understanding of current GSCM and green logistics practices at CIPLA Medpro Manufacturing; (2) providing guidelines for implementing the GSCM and green logistics initiatives at CIPLA Medpro Manufacturing; (3) identifying the purpose of the adoption of the various GSCM and green logistics initiatives at CIPLA Medpro Manufacturing; (4) highlighting the organisational goals of GSCM and green logistics initiatives at CIPLA Medpro Manufacturing; and (5) providing insight into future sustainable strategies at CIPLA Medpro Manufacturing.

The suggested method of training for this phase is internal training sessions conducted by management/ champions of GSCM and green logistics initiatives at CIPLA Medpro Manufacturing. This phase is the most critical as it provides context to the entire training programme. Employees within the Logistics Department should have a complete understanding of the GSCM and green logistics initiatives conducted at CIPLA Medpro Manufacturing by the end of phase III. The benefit of this approach is that all logistics employees within CIPLA Medpro Manufacturing would be equipped with the knowledge to drive sustainable initiatives within CIPLA Medpro Manufacturing and in a personal capacity.

These internal training sessions should be conducted between two to three months and should also involve on-the-job training/ examples.

Table 6.1: Training/ intervention plan

PHASE I				
Action	**KPI**	**Timeframe**	**Target**	**Output**
Developing an understanding of sustainability on a foundational basis	Number of sessions by external experts	One to three months (depending on staff availability)	One	Improved awareness and understanding by logistics staff of sustainability on a foundational level
	Number of short courses		Two	
PHASE II				
Developing an understanding of green logistics and GSCM	Number of sessions by external experts	Two to four months (depending on staff availability)	Two	Knowledgeable logistics staff members capable of understanding and implementing GSCM/ green logistics initiatives within the organisation; Employees capable of driving and developing GSCM/ green logistics initiatives at CIPLA Medpro Manufacturing
	Number of short courses		Three	
PHASE III				
Training staff members on the green logistics and GSCM initiatives conducted by CIPLA Medpro Manufacturing	Internal training sessions by green logistics champions/ managers	Two to three months (depending on staff availability)	Four	Highly capable and effective employees who are able to conduct GSCM/ green logistics initiatives independently; Employees can now provide feedback and suggestions to improve the success rate of GSCM/ green logistics practices conducted at CIPLA Medpro Manufacturing.

The above Table provides the framework for the training/ intervention plan to develop employees to become capable logistics staff members. This will improve the success rate of GSCM/ green logistics initiatives at CIPLA Medpro Manufacturing, thus improving environmental performance and developing capacity within the organisation for sustainable development.

6.5.3 Alignment of GSCM/ green logistics practices to government incentives

The majority of staff members within the Logistics Department at CIPLA Medpro Manufacturing indicated that they do not know the impact of the government on the encouragement of the GSCM initiative at CIPLA Medpro Manufacturing. Even though the pharmaceutical sector is highly regulated it was identified that some of these regulations actually form barriers to the adoption of GSCM/ green logistics initiatives at CIPLA Medpro Manufacturing. An overwhelming number of respondents agreed that the government should be the driver of GSCM within the pharmaceutical industry as opposed to the companies themselves. This indicates that government support of GSCM initiatives is not visible in the pharmaceutical industry, and specifically CIPLA Medpro Manufacturing. Although government legislation regulates the pharmaceutical industry, the lack of support for sustainable initiatives is evident. This serves as a barrier to GSCM and green logistics at CIPLA Medpro Manufacturing as the lack of government support reduces its relevance, according to respondents.

According to the Department of Forestries, Fisheries and the Environment (2022), there are a number of subsidies and taxes that have been established to promote sustainable manufacturing. Although these policies are not developed solely for the purpose of establishing GSCM and green logistics initiatives, they directly impact these initiatives. Therefore, to effectively realise these subsidies, CIPLA Medpro Manufacturing must understand the potential benefits and risks associated with these policies. This would require a thorough analysis by management and stakeholders to fully understand the policies. For example, to identify the tax rebates that are associated with the greening of public and private buildings and then take advantage of the greening of infrastructure to reduce tax rebates and minimise disruptions such as load-shedding.

Weekly meetings with stakeholders to realise the benefits that are associated with government subsidies and taxes to drive sustainable development and, ultimately, GSCM/ green logistics are suggested. During these meetings, the below agenda should be discussed: (1) analysis of government subsidies and taxes (one per session) in relation to sustainable development; (2) identification of potential costs and benefits associated with these subsidies; (3) identification of feasible and beneficial sustainable development plans, (4) brainstorm effective implementation methods for sustainable development plans, and (5) review actions that have been taken to initiate sustainable development plans.

These sessions can be used to create sustainable development within the organisation whilst creating additional financial benefits from government subsidies and tax rebates. This would also provide a deeper insight to employees and other stakeholders on the purpose of GSCM and green logistics initiatives. In the long-term, potential sustainable strategies can stem from these sessions and provide the foundation for sustainable development at CIPLA Medpro Manufacturing.

6.6 Improvement of managerial and policy decisions

It is evident that CIPLA Medpro Manufacturing has established a number of green logistics initiatives, however, a key gap is that managerial and policy decisions are focused on process and procedure changes and very little on human resources upskilling. A suggestion emanating from the study is that policies be more focused on the development of human resources to better develop staff members in understanding the purpose of green initiatives at CIPLA Medpro Manufacturing and its overall impact on society and the environment. This is a core suggestion as it would also directly impact employees' ability and motivation to adopt and implement GSCM and green logistics initiatives at CIPLA Medpro Manufacturing.

It was noted by the key informant that a number of sustainable processes were adopted from CIPLA India, which leads to the perception that green policies could have also been adopted from CIPLA India. The government policies in India vary from those in South Africa, and therefore, a suggestion is that green polices unique to South Africa are established. The establishment of decentralised policies would be beneficial for CIPLA Medpro Manufacturing as it would be tailored to the unique policies and landscape of South Africa. Future policy decisions should also be established in conjunction with government policies and incentives, as discussed previously. This would allow for the organisation to not only adhere to environmental policies set by the South African government but also receive possible rebates and incentives offered by the government.

6.7 Implications and recommendations for future studies

A number of recommendations stem from the study for future research within the field of green logistics and GSCM within the pharmaceutical industry. Future studies into the barriers affecting green logistics in the South African pharmaceutical industry should be conducted across different pharmaceutical companies that operate within South Africa to develop a more holistic understanding of the barriers. Barriers can vary between organisations, as identified by findings, as elements such as a lack of training on GSCM initiatives may be unique to an organisation. It is also important to note that different pharmaceutical companies would employ different techniques in their supply chain and, therefore, would experience different barriers to GSCM and green logistics initiatives. The significance of this research would be that patterns between findings impacting different organisations would highlight underlying external barriers that are not easy to identify in a single organisation. It would also provide the opportunity to identify best practices for combating barriers that impact GSCM and green logistics initiatives within the pharmaceutical sector.

Another suggestion is that future studies be conducted across different provinces. Although this could not be the case for this study, as CIPLA Medpro Manufacturing had one manufacturing site at the time of the data collection, it may not be the case in the future. Different geographic locations would be impacted by different barriers, as proximity to certain amenities and transport routes would influence an organisation's operations and strategies.

A core suggestion for future research is that other supply chain-related operational departments be included in the study. It is evident that supply chains and their respective departments operate as a cohesive unit, and as such, roles between various operational units overlap. This suggests that staff members from the different departments within supply chains could have valuable information that can highlight the barriers that affect green logistics in the South African pharmaceutical industry. The insights of departments such as procurement, engineering, and production and marketing will also contribute to the understanding of the barriers that impact green logistics.

6.8 Conclusion

The need for successful and sustainable supply chains in South Africa has been exacerbated by external and internal forces such as global economic instability, pandemics, wars and political instability. This is especially the case for organisations operating within the pharmaceutical sector as their supply chains often reach across countries and are impacted by global and local factors. Maintaining a sustainable and effective supply chain is becoming increasingly difficult and more important than it has ever been. The need for identifying the factors impacting these pharmaceutical supply chains is paramount to ensure the success of these life-supporting value chains.

This study focused specifically on the factors impacting green logistics and GSCM within the pharmaceutical industry in South Africa. It is paramount that further studies be conducted to identify the barriers and drivers of GSCM and green logistics initiatives within the pharmaceutical sector in South Africa. The pharmaceutical industry is especially important in countries that are afflicted by various pandemics and have economically vulnerable populations. The adaption of pharmaceutical organisations to become sustainable is critical to the survival of both societies and businesses. This has become more evident in the past three years with a surge in natural disasters and pandemics disrupting supply chains in South Africa. GSCM and green logistics initiatives are not only required to prevent future disruptions but also to build robust supply chains to manage current disruptions. According to Kumar et al. (2019), the need for GSCM initiatives within the pharmaceutical sector is critical to the success of these highly sensitive supply chains. Haiyun et al. (2021) support this argument by stating that supply chain profitability is directly linked to GSCM practices in the current economy due to the lengthening of supply chains, globalisation, global political instability and the increasing risk of pandemics. Therefore, the identification of threats to GSCM and green logistics is critical to ensuring that pharmaceutical supply chains are future-proof.

The conceptual framework of the study contributes substantially to a deeper understanding of the link between GSCM and the performance of pharmaceutical companies. Various barriers to GSCM are explored and impacts are exposed to better understand the potential risk implications that they have on the adoption of sustainable initiatives within the pharmaceutical sector. This thesis has identified barriers to GSCM and green logistics within the pharmaceutical sector whilst examining the unique factors that impact the South African pharmaceutical markets and stakeholders. The findings from this study provide crucial insights into potential solutions to improving the success of GSCM and green logistics within the pharmaceutical sector in South Africa.

To develop robust supply chains that are able to withstand the growing threats both locally and internationally, pharmaceutical companies must build capacity and drive the upskilling of employees that are sustainability-orientated. This requires exemplary training programmes that utilise both internal and external expertise. Failure to adapt supply chains to changing environmental and economic threats will not only cause irreversible damage to the environment but ultimately cause the downfall of the pharmaceutical industry. This study may not have provided all of the solutions to both environmental and economic concerns plaguing South

African pharmaceutical supply chains, but aims to lay the foundation for the reduction and alleviation of these threats. The aim of the study is to contribute to identifying and minimising the barriers that hinder the adoption and success of GSCM.

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APPENDICES

Appendix 1: Survey

Survey on "The barriers affecting Green Logistics in the

South African Pharmaceutical Industry: A Case study at CIPLA South Africa".

By Aveshin Reddy

This survey is aimed at determining the barriers that affect green logistics at CIPLA South Africa and ONLY used to achieve the objectives of the study. Respondents can feel free to contact the researcher at any point to clarify any confusion regarding this survey and anything related to the study.

Respondents are requested to answer all the questions that this survey is comprised of, the purpose of this study is purely academic and the questions in this study will be subjected to a safety check by CIPLA South Africa executives before it is administered. This document adheres to all the ethical considerations put forth by the University of KwaZulu-Natal.

Research Objectives

1. To assess current logistics processes at CIPLA South Africa in relation to GSCM practices
2. To examine staff perceptions and attitudes towards climate change and environmental strategies generally and at CIPLA South Africa specifically
3. To assess the external barriers affecting the implementation of green logistics at CIPLA South Africa
4. To assess the internal barriers affecting the implementation of green logistics at CIPLA South Africa
5. To evaluate whether CIPLA South Africa has countermeasures in place to combat barriers and, if so, the effectiveness of these measures
6. To forward recommendations for improved green logistics at CIPLA South Africa based on research findings

1. Demographic information

This section aims to identify the basic information of the respondent to determine any patterns that can be linked to the topic.

1.1 Please indicate your position within CIPLA South Africa:

Job Role	Answer (Tick)
Manager	
Team Leader	
Supervisor	
Storeperson	
Buyer	
Supervisor	
Administrator	
Shop Steward	
Other (specify)	

1.2 Please indicate your highest level of education completed:

Education level	Answer (Tick)
No formal schooling	
Partial primary schooling completed	
Primary schooling completed	
Secondary schooling completed	
Diploma/ Certificate completed	
Undergraduate degree completed	
Postgraduate degree completed	
Other (specify)	

1.3 What is your age group (in years)?

Age group	Answer (Tick)
18 – 20	
21 – 30	
31 - 40	
41 – 50	
51 – 60	
60 – 65	

1.4 What is your gender?

Gender	Answer (Tick)
Female	
Male	

2. Attitudes to life and environmental issues

2.1 Please indicate which you believe to be the top five most important issues for society generally and for businesses currently? (On the table below)

Please TICK the most important issues from the list below (Only tick 5 of each).

Issues	2.1.1 Most important for society	2.1.2 Most important for business/industry
Career/ job/ employment		
Conflict and war		
Corruption		
Education		
Environmental issues		
Famine and hunger (food security)		
Financial situation		
Health		
Population growth		
Poverty		
Quality of life		
Safety and crime		
Other (specify)		

2.2 Which are the most important environmental issues that impact you or that you experience?

Please TICK your answer on a scale ranging from 1 (not important at all) to 5 (very important) or Don't Know (DK)

Issues	1	2	3	4	5	DK
Air pollution (from factories and cars)						
Chopping down of trees/forests						
Extreme weather conditions, e.g. floods, droughts, etc.						
Fossil fuel use						
Genetically modified crops						
Hazardous waste (chemicals, radioactive, medical)						
Land pollution (waste, litter)						
Loss of wildlife (animals)						
Nuclear power						
Ozone depletion						
Pesticides and herbicides						
Poor farming practices						
Population explosion						
Poverty						
Traffic congestion						
Water pollution (contamination of rivers, sea)						
Other (specify)						

2.3 Which of the following environmentally-friendly practices do you personally undertake/participate in at home? If "Never", why?

Environmentally-friendly practices	Never	Sometimes	Always	Why?
Recycling				
Reuse of water				
Water harvesting				
Reduction of consumption (buy less)				
Purchase green/ fair trade products				
Composting of home waste				
Use of alternative energy sources other than electricity				
Planting of trees/ vegetation				
Proper disposal of waste				
Use of public transport				
Buying environmentally-friendly products				
Disposing of waste responsibly				

2.4 Which of the following do you believe are causes of climate change? Select the impact that each issue has on climate change and explain your answer.

Issues	No impact	Little impact	Significant impact
Deforestation (cutting of trees/ forests)			
Emissions from industry/ factories			
Emissions from vehicles (cars, trucks, buses)			
Energy generation from fossil fuels (coal, oil, gas)			
Nuclear testing			
Ozone layer depletion from chlorofluorocarbons (gases from refrigerants, cleaning solvents, and aerosol propellants)			
Waste disposal			
Increase in human population and consumption			
Other (specify)			

3. Knowledge and perceptions of GSCM practices

3.1 What, in your opinion, is green logistics?

____
____
____
____

3.2 What, in your opinion, is Green Supply Chain Management (GSCM)?

____
____
____
____

3.3 Do you believe that climate change will affect GSCM practices at CIPLA South Africa? If yes, in what way?

Yes	No	Don't know	Explanation

3.4 Are you satisfied that our country is doing enough to encourage GSCM practices in the workplace? If no, what would you suggest?

Yes	No	Don't know	Suggestion if no

3.5 Who do you think is best placed to promote and ensure GSCM practices within the industry?

	Should take the lead	Be involved but not take the lead	Not be involved
Business and industry			
National government			
Provincial government			
Local government			
Non-governmental organisations			
Other (specify)			

3.6 Do you think the government must have mandatory policies/ force business and industry to adopt GSCM practices?

Yes	No	Don't know	Explanation

3.7 Please rate the extent to which each of the GSCM practices listed below should be prioritized with business and industry generally and in the pharmaceutical industry specifically.

Use the scale: 1 = make mandatory/ compulsory 2 = Important but not compulsory 3 = Not important 4 = Don't know

GSCM practice	Business and industry generally	Pharmaceutical industry
Green procurement (sourcing from environmentally responsible partners)		
Local sourcing of goods and services		
Inventory management		
Green production (using processes that is energy efficient and generates less waste)		
Using environmentally-friendly materials		
Reverse logistics (reselling, refurbishing, remanufacturing, reusing and recycling goods)		
The green design of goods/ products (eg. easier to transport, uses less energy, etc.)		
Green packaging using environmentally-friendly packaging, recycling and reusing		
Green warehousing (including eco-friendly features such as solar walls, on-site recycling, etc.)		
Reuse (eg. reusing durable packaging in supply change)		
Recycling (eg. paper)		
Reducing waste generation		
Green transport and distribution (eg. low carbon emission vehicles, route optimisation and shipping in bulk/ load optimisation)		
Being a responsible corporate citizen (corporate social responsibility projects and investments)		

3.8 What are the benefits of GSCM to CIPLA South Africa? Tick all that apply. Do not prompt.

Environmental benefits/ sustainability of resources (fewer carbon emissions)	
General societal benefits to improve the quality of life of people and nature (ethical behavior)	
Aim marketing at customers who value environmental responsible practices	
Increased customer satisfaction/ loyalty	
Improves the company’s reputation and brand	
Lower cost for consumers as a result of increased efficiency	
Reduces operational costs	
The positive impact of the company’s financial performance	
Improved quality and better products	
Increased innovation in the industry	
Increased employee satisfaction	
Reducing environmental/ health risks (safer and secure work environment)	
Other (specify)	

4 The barriers to implementing GSCM sustainable practices that are experienced at CIPLA South Africa

4.1 Please indicate the level of agreement with the following statements in relation to sustainable practices at CIPLA South Africa. If you "Agree", what can CIPLA do to mitigate these factors?

Statements	Agree	Neutral	Disagree	Possible solution if agree
High levels of energy consumption				
Air pollution increases				
Solid waste increases				
Areas are more polluted/ lots of litter				
There is the overconsumption of water				
Noise pollution increases				
There is land loss/ habitat degradation				
There is a loss of biodiversity				
People learn more about conservation and taking care of the environment				

4.2 Please identify which green logistics factors CIPLA South Africa is currently partaking in. If your answer is "NEVER" please select a reason from the list on the table below. Insert the accompanying number. If your answer is "Other", please specify in the place provided.

1	**Unaware of alternatives**
2	**High financial costs/ lack of funding**
3	**Not a core competency of the business/ lack of support from management**
4	**Lack of know-how or knowledge of green practices**
5	**Other (specify)**

GSCM practice	Never	Sometimes	Always	If never, why?
Green procurement (sourcing from environmentally responsible partners)				
Local sourcing of goods and services/ use of local suppliers				
Inventory management				
Green production (using processes that is energy efficient and generates less waste)				
Using environmentally-friendly materials				
Reverse logistics (reselling, refurbishing, remanufacturing, reusing and recycling goods)				
The green design of goods/ products (eg. easier to transport, uses less energy, etc.)				
Green packaging using environmentally-friendly packaging, recycling and reusing				
Green warehousing (including ewco-friendly features such as solar walls, on-site recycling, etc.)				
Reuse (eg. reusing durable packaging in supply change)				
Recycling (eg. paper)				
Reducing waste generation and proper disposal of waste				
Shipping in bulk/ load optimisation)				
Use of low carbon emission vehicles				
Route optimisation				
Reduced fuel consumption through the use of various strategies				

Being a responsible corporate citizen (corporate social responsibility projects and investments)				
Other (specify)				

4.3 Please identify which of the factors below you experience or believe to be a factor that affects implementing GSCM practices negatively at CIPLA South Africa. Please TICK the appropriate column, if "Yes" provide a reason for your answer.

Factors	Yes	Maybe	No	Reason
High cost				
Lack of understanding to incorporate green buying				
Inappropriate organisational structure				
Cost reduction at the cost of the environment				
Lack of management commitment				
Lack of adaption of advancement in technology/manufacturer's reluctance to change				
Lack of training				
Too complex to implement				
Low return on investment				
Cost of eco-friendly packaging				
Lack of technological infrastructure				
Inhibits innovation				
Lack of skilled human resources in the implementation of GSCM				
Poor supplier commitment				
Not willing to change trade information				
Lack of government support				
Lack of information technology				
Lack of ethical standards and corporate social responsibility				
The pressure of lower prices				
Lack of demand and public awareness				
Competition and uncertainty				
Lack of awareness in society				
Poor supplier commitment				
Lack of knowledge and experience among suppliers				

Lack of understanding among supply chain stakeholders				

THANK YOU FOR YOUR TIME, IT IS GREATLY APPRECIATED.

Appendix 2: Key informant interview guide

NAME: ……………………………………………………………………………………………….

POSITION: ……………………………………………………………………………………………….

DEPARTMENT: ……………………………………………………………………………………………….

ORGANISATION: ……………………………………………………………………………………………

TEL.: …………………………………… CELL.: ……………………………………..

E-mail: ……………………………………………………………………………………………………

<u>Question 1</u>

What is your understanding of climate change and its impacts? What are the main causes/ drivers of climate change?

…….

…….

<u>Question 2</u>

What are the most important issues facing society currently and how do climate change and environmental considerations more generally relate to these issues?

…….

…….

<u>Question 3</u>

What are the most important issues facing industry/ business currently and how does climate change and environmental considerations more generally relate to these issues?

…….

…….

<u>Question 4</u>

How does climate change impact industry/ business? Specifically, what are the key aspects pertinent to CIPLA Medpro Manufacturing?

…….

…….

Question 5

Do you think that industry/ business generally and CIPLA Medpro Manufacturing in particularly is responding to climate change challenges? How can they improve their responses and what are they doing well?

…….

…….

Question 6

What are the sustainable processes that CIPLA Medpro Manufacturing follows from the beginning to the end of its supply chain/ logistics chain? (Process mapping)

…….

…….

Question 7

Within the mapped processes what are the sustainable practices that CIPLA Medpro Manufacturing have in place? What are the barriers that CIPLA Medpro Manufacturing has faced with regard to these sustainable practices? How has/is the organisation overcome/overcoming these barriers?

…….

…….

Question 8

What are the challenges to changing workplace behavior to reduce industry contribution to climate change?

…….

…….

Question 9

What recommendations can you make to improve CIPLA Medpro Manufacturing's response, particularly to reduce the barriers to green logistics? What recommendations can be made to pharmaceutical companies in South Africa to be more responsive to climate change and environmental management specifically within the logistics department?

…….

…….

Question 10

Who do you think should be responsible in CIPLA Medpro Manufacturing for driving these changes?

…….

…….

Appendix 3: Informed consent letter

HUMAN SUBJECTS RESEARCH CONSENT LETTER

University of KwaZulu-Natal
Letter of Informed Consent
Date:

I, Mr Aveshin Reddy (Reg. No. 211542196) am a PhD student at the University of KwaZulu-Natal (UKZN). I am conducting research on “The barriers affecting Green Logistics in the South African Pharmaceutical Industry: A Case study at CIPLA South Africa”. Information for this study will be collected from staff members at CIPLA South Africa using Surveys and Key informant interviews. Please note that the respondent’s names will not be included in the report. Your confidentiality is important and will be maintained throughout the study. The information collected will be used solely for the purposes of completing my thesis and future papers, journal articles and books that will be written by the researcher.

I would greatly appreciate your completing the survey/interview discussion. Since the validity of the results of the study depends on a high response rate, your participation is crucial to the success of this study. Your co-operation will contribute to the growing body of knowledge aimed at understanding climate change issues and challenges in business, but in particular in the pharmaceutical industry.

Please be assured that your responses will be held strictly confidential and no identity will be used in the results of the study. Your anonymity and confidentiality will be preserved at all times. Furthermore, your participation is entirely voluntary and you may withdraw your permission to participate in this study without explanation at any time.

I thank you for your time in completing this survey/interview/focus group discussion. Do not hesitate to contact me or my supervisor if you have any questions or concerns about the questionnaire or any aspect of this study. My contact details are [redacted] (cell) or [redacted] (e-mail). My supervisor is Prof. Urmilla Bob, and her contact details are [redacted] (cell) or Bobu@ukzn.ac.za (e-mail).

Please complete the section below:

I ………………………………………………………….. (Full names of respondent) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participate in the research project.
I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Signature of Respondent……………………………….………

Date……………………………………………………..……..

I may/may not voice record the interview or focus group discussion.
(Does not apply to survey)

Appendix 4: Gate keeper letter

UNIVERSITY OF
KWAZULU-NATAL

03 March 2020

Dear Mrs/Miss Jamie Lee Naidoo

PERMISSION TO CONDUCT RESEARCH

This letter is sent with regard to a student whom is doing a PhD in Agriculture and Environmental science degree at the University of KwaZulu-Natal, as a request for permission.

I hereby request permission for this PhD student to conduct studies at Cipla Medpro Manufacturing; the title of the study is as follows:

"The Barriers affecting Green Logistics in the South African Pharmaceutical Industry: A case study at Cipla Durban"

The supervisor of the student is Professor Urmilla Bob will be available at any stage to answer any queries or discuss any comments you may have and may be contacted via email: bobu@ukzn.ac.za. On behalf of the School of Agriculture and Environmental sciences and our PhD student, it would be greatly appreciated if you would be willing to provide us access to your organisation, in order to complete his studies.

If you agree to allow our student to conduct his study at your organisation, please could you sign the next page of this letter.

Please also indicate whether the organisation name may/~~may not~~ (delete which is not applicable) be used in this study.

Yes/~~No~~

Yours faithfully

Urmilla Bob (PROF)
School of Agriculture and Environmental sciences
Dean of Research

This is to confirm that the PhD (Agriculture and Environmental sciences) student may/may not conduct their study at:

CIPLA MEDPRO SA (PTY) LTD t/a CIPLA MEDPRO MANUFACTURING

[redacted]
Signed

JAMIE-LEE NAIDOO
Name:

06 . 03 . 2020
Date

Company Stamp;

Cipla
1474 SOUTH COAST ROAD
P.O. BOX 32003, MOBENI, 4060
DURBAN, SOUTH AFRICA
TELEPHONE: +27 (31) 451 3800
EMAIL: customercare@cipla.com

Appendix 5: Non-disclosure agreement

27 November 2017

Dear Aveshin,

<u>RE: Non-disclosure & permission to access company information for study purposes</u>

This serves as confirmation that we, Cipla Medpro SA (Pty) Ltd. t/a Cipla Medpro Manufacturing have received your request to have access to our company information as part of your current studies towards a PhD in Agricultural and Environmental Science.

We wish to confirm that your request has been approved on condition that;

- You take full responsibility for all information shared with you by any and all employees of the above-mentioned company
- No information is shared with our direct and/or indirect competitors or any third party, excluding the University of Kwa-Zulu Natal
- You will discuss and obtain prior approval from the relevant Manager regarding the information you require
- The information you require is to be used for your study purposes only.

We trust that you will treat all information as private and confidential and take full responsibility for it. This arrangement is valid for the duration of your study programme.

We would like to take this opportunity to wish you the best of luck in your studies.

Kind regards,

[redacted]

HR Business Partner

Cipla Medpro
SOUTH AFRICA (Pty) LTD.
1424 SOUTH COAST ROAD
P.O. BOX 32003 MOBENI 4060
DURBAN SOUTH AFRICA
TELEPHONE +27 (31) 451 3800
FAX +27 (31) 451 3887

I, Aveshin Reddy hereby confirm acceptance of the terms and conditions as set out above.

[redacted]
Signature

05/12/2017
Date

[redacted]

Prof Urmilla Bob (Supervisor)

12 December 2017

Cipla Medpro
SOUTH AFRICA (PTY) LTD

www.ciplamedpro.co.za

CIPLA MEDPRO SOUTH AFRICA PROPRIETARY LIMITED t/a CIPLA MEDPRO MANUFACTURING
Reg No 2002/018027/07

Appendix 6: Ethical approval letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

17 March 2021

Mr Aveshin Reddy (211542196)
School of Agriculture, Earth & Environmental Sc
Westville Campus

Dear Mr Reddy,

Protocol reference number: HSSREC/00000196/2019
Project title: The barriers affecting green logistics in the South African pharmaceutical industry: A case study at Cipla South Africa

Approval Notification – Amendment / Recertification Application

This letter serves to notify you that your application and request for an amendment and recertification received on 13 February 2021 has now been approved as follows:

- Recertification for 1 year (valid until 17 March 2022)
- Amendment to:
  - Sample size
  - Research Site

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an 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.

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

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

....

Professor Dipane Hlalele (Chair)

/ms

Humanities & Social Sciences Research Ethics Committee
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Tel: +27 31 260 8350 / 4557 / 3587
Website: http://research.ukzn.ac.za/Research-Ethics/

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS