FACTORS AFFECTING GREEN SUPPLY CHAIN MANAGEMENT (GSCM) INITIATIVES: A CASE STUDY AT CIPLA MEDPRO MANUFACTURING

Dissertation

Submitted to the College of Law and Management Studies,

University of KwaZulu-Natal, Westville

By

Aveshin Reddy

In Fulfilment of the Requirements

For the Degree of Masters of Commerce in Supply Chain Management

November 2016

Supervised by Professor Micheline Juliana Naude

DECLARATION

I declare that this research project is my own work. It is submitted in fulfilment of the requirements for the degree Masters of Supply Chain Management at the University of KwaZulu-Natal, Westville. It has not been submitted before for any other degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to conduct this research.

Aveshin Reddy

Date

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude and appreciation to Professor Micheline Juliana Naude for the motivation and guidance that she has given. I would also like to give recognition to Professor Debbie Vigar-Ellis, Dr Sanjay Soni and Professor Urmilla Bob for their assistance – it is greatly appreciated.

A special thank you goes to Cipla Medpro Manufacturing Mobeni staff who facilitated for the study to be conducted on their premises and for the sharing their knowledge that has made this study possible.

A very special thank you goes to the National Research Foundation for funding this research study. Their financial assistance has driven this study and funded it up until completion.

I would also like to thank my loving family for their support and motivation throughout the research study. A special thanks to my loving mother, Julie Reddy, and girlfriend, Sasha Badul for their love and support.

Finally, the most important vote of thanks goes to God Almighty, without you none of this would be possible, thank you for guiding me and giving me the strength to complete this research project.

ABSTRACT

Sustainability has become a critical issue for both society and businesses globally. With the increase of natural disasters and global issues such as water shortages, acid rain and climate change companies have started focusing on reducing their carbon footprint to ensure that the world's natural resources are sustained for the foreseeable future.

Many international and local companies are now looking to incorporate green initiatives into key functional areas such as Supply Chain Management. This has given rise to Green Supply Chain Management which is the incorporation of sustainable initiatives into the supply chain of a company.

In the pharmaceutical industry the implementation of Green Supply Chain Management initiatives is a challenge, because of the complexity of their supply chain. Consequently, it is essential to determine what factors affect these initiatives in order to successfully implement and maintain Green Supply Chain Management initiatives.

In South Africa there are many other factors that pharmaceutical companies need to take into consideration before the implementation of Green Supply Chain Management. Some of these factors include high costs, lack of government support and pressure to lower prices. This makes it more difficult for companies such as Cipla Medpro Manufacturing to incorporate green initiatives into their supply chain. Some recommendations to overcoming these factors include the reduction of costs through better product design and the use of green technologies in order to reduce costs.

If the key factors affecting Green Supply Chain Management can be identified pharmaceutical companies can focus on overcoming these factors and utilise their resources more efficiently and effectively. This will improve the success rate of Green Supply Chain Management initiatives overall and make them a more attractive method to reduce their companies carbon footprint.

TABLE OF CONTENTS

CHAPTER 2: GREEN SUPPLY CHAIN MANAGEMENT

CHAPTER 4: RESEARCH METHODOLOGY

CHAPTER 5: ANALYSIS AND DISCUSSION OF DATA

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Supply chain management (SCM) is an important component of businesses across the world (Monczka, Handfield, Giunipero, Patterson & Waters, 2010:6). It is involved with essential business processes such as procurement, logistics, reverse logistics and operations management (Hugos, 2011:2). Christopher (2005:3) identifies SCM as the flow of materials, finances and information as they move from supplier to the manufacturer, then to the wholesaler and the retailer and finally to the customer. SCM involves the coordination of the flow of materials and operations both internally and externally from an enterprise (Stadtler & Kilger, 2000:9). According to Wisner, Tan and Leong (2015:7), SCM is the design and management of value adding processes across an organisation's boundary in order to meet the needs of the end consumer.

The greening of a supply chain refers to the implementation of practices that help create sustainability within supply chain activities (Kumar & Chandrakar, 2012:1). Green supply chain management (GSCM) has many definitions and has been a commonly used term in both the SCM and environmental management literature (Zhu & Sarkis, 2004:265). Srivastava (2007:53) recognises GSCM as the integration of environmental thinking into SCM. This includes aspects such as material sourcing and selection, product design, manufacturing processes, the delivery of the product to the customer and product end-of-life management (Srivastava, 2007:54-55). Diminishing resources and increases in natural disasters are some of the many factors that pressurise businesses to improve their environmental sustainability (Zhu, Sarkis & Lai, 2007:1043). GSCM is a method of conducting supply chain activities in a manner that is more environmentally friendly (Srivastava, 2007:55). Within this context, it is evident that GSCM has become more popular amongst businesses globally. It is key to determine the factors that affect GSCM in order for companies to implement it successfully.

The study was undertaken at Cipla Medpro in Durban. The aim was to provide insights into GSCM initiatives, the factors affecting GSCM initiatives and to find out whether Cipla Medpro has measures in place to overcome the factors that negatively impact on GSCM initiatives in their planning, procurement and logistics department.

1.2 BACKGROUND OF THE STUDY

SCM affects a business' competitiveness, the way it operates, how it procures its material and how it is disposed (Fawcett, Ellram & Ogden, 2014:3). SCM controls core business processes such as procurement, logistics, reverse logistics and operations management (Monczka *et al*., 2010:6). These core processes have a strong impact on the environmental sustainability. Issues such as diminishing resources and increases in natural disasters pressurise businesses to improve their environmental sustainability (Zhu *et al.,* 2007:1043). This has given rise to a supply chain initiative known as GSCM. The aim of GSCM is to reduce environmental impacts caused by supply chains.

1.2.1 The Importance of Green Supply Chain Management Initiatives

Srivastava (2007:53) identifies GSCM as the integration of environmental thinking into SCM. This includes aspects such as material sourcing and selection, product design, manufacturing processes, the delivery of the product to the customer and product end-of-life management (Srivastava, 2007:53-54). According to Zhou (2009:75), GSCM is a modern type of management which focuses on environmental influence and resource utilisation efficiency. The pressures that the deterioration of the environment have created forced businesses to look towards the supply chain department to help create a sustainable method of operating (Griskevicius, Tybur & Van den Bergh, 2010:393). However many businesses put emphasis on GSCM not only for creating sustainability but also to improve their economic standing (Broek, 2010:11). GSCM assists businesses in creating a positive public image, strengthening long and short term supplier relationships and fuels innovation (Broek, 2010:11). Irrespective of the reason, GSCM is becoming an area of focus for many businesses. Therefore, it is important to identify the factors that affect GSCM in order to successfully implement this green initiative (Dashore & Sohani, 2013:2021).

1.2.2 GSCM in South Africa

The South African government has shown an increasing interest in GSCM initiatives in order to keep in line with global trends (Ojo *et al.,* 2013:316). It has promoted the efficient and effective use of resources at their disposal, particularly within industries such as construction (Ojo, Mbohwa & Akinlabi, 2013:316). The South African private sector has also taken initiatives to implement GSCM to improve sustainability. Table 1.1 lists some main businesses that have implemented GSCM in South Africa.

Table 1.1: Some Main Businesses that have Incorporated GSCM Initiatives within South Africa

South African business incorporating GSCM	Initiatives undertaken
Woolworths	Started using nitrogen-refrigerated trucks that reduce carbon emissions
Volkswagen	Incorporated initiatives such as Blue Factory, Blue Motion and Blue Environment which are all related with promoting green initiatives and GSCM.
Standard Bank	Instituted an online measurement tool known as ECO Fleet. Their aim was to (1) measure their fleet's carbon emissions; and (2) identify ways to reduce their carbon footprint.
Pikitup	Purchased a fleet of trucks that meet Euro emission standards in order to reduce emissions.
Imperial Logistics	Industry leader for GSCM in South Africa who has implemented numerous GSCM initiatives such as load maximisation to improve sustainability.

Source: Van Rensburg (2015)

Currently, South Africa contributes to 1% of the global carbon emissions produced annually. The reason behind this is that South Africa is centrally situated and has strong logistics capabilities (Pillay & Mbhele, 2015:65). Already in 1993, transport was identified as a large contributor to pollution caused by carbon emissions (Underwood, 1993:10).

1.2.3 GSCM in the South African Pharmaceutical Industry

Supply chains are long and costly (Faisal, 2015:2) and Pharmaceutical Supply Chains are amongst some of the most costly and complex as they operate in a continuously evolving industry. Pharmaceutical supply chains also produce considerably high levels of pollution especially as by-products from the production processes (Narayana, Elias & Pati, 2014:38). Waste from production is difficult to recycle and dispose of due to the nature of pharmaceutical products (Narayana *et al.,* 2014:381). This makes GSCM initiatives difficult to implement and maintain.

In South Africa, pharmaceutical companies such as Cipla play a pivotal role in society as they supply medication that is in high demand to combat epidemics such as Tuberculosis, Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome. Cipla Medpro Manufacturing manufactures medication such as Odimune which is a commonly used Antiretroviral in South Africa (Cipla, 2016).

Insufficient studies have been conducted on identifying the factors that affect GSCM initiatives in pharmaceutical supply chains within South Africa. Against this background, the study aimed to identify the factors that affect GSCM initiatives at Cipla Medpro Manufacturing. The reason for choosing Cipla Medpro Manufacturing is because it is a developed international pharmaceutical business that has been

in operation for over 75 years and manufactures medication that is in high demand in South Africa (Cipla, 2016). The company operates in over 167 different countries and has GSCM initiatives in place (Cipla, 2016). This study has been conducted at the Durban branch situated in Mobeni. The reason for selecting this branch is because it is the manufacturing hub of Cipla within South Africa. In addition, the researcher has been given permission to conduct this study there.

1.3 SCOPE OF THE STUDY

This study uses the definition for SCM provided by the Council of Supply Chain Management Professionals. The definition states that *"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities"* (Council of Supply Chain Management Professionals, 2016). It identifies the four core areas of SCM, namely, planning, procurement, conversion/production processes and logistics activities. Cipla Medpro Manufacturing's supply chain focuses on three of the four core areas, namely planning, procurement and logistics management. Production is seen as its own department within Cipla Medpro Manufacturing due to its size. Management of this functional area falls under its own category called production management.

The scope of this study was limited to the three functional areas of Cipla Medpro Manufacturing's supply chain namely procurement, logistics and planning. All the staff members from the afore-mentioned functional areas from the Cipla Medpro Manufacturing branch participated in this study. All other functional areas fall out of the boundaries of this study and did not take part in the study. This study has only been conducted at the Cipla Durban branch which is the production facility for South Africa. All other facilities have been excluded from this study and inputs from these branches have been omitted.

1.4 DEFINITIONS OF TERMS

The key concepts and terms of this study have been tabulated in table 1.2.

Table 1.2: Definitions of Terms

Term	Definition
SCM	It is the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities (Council of Supply Chain Management Professionals, 2016: Internet).
Going Green	To incorporate environmentally friendly practices into a business function or to improve the sustainability of the environment through practices that have a reduced negative effect on the environment (Kumar & Chandrakar, 2012:1).
Supply Chain	The value adding chain of the movement of resources from procurement stage of goods and services up until its consumption and disposal by the end consumer (Monczka *et al.*, 2010:6).
GSCM	Is the incorporation of environmental practices into supply chain activities to improve environmental performance and reduce a business' negative impact on the environment (Zsidisin & Siferd, 2001:68)
Logistics	Is used as a term to identify the movement and management of goods and services which includes transportation, warehousing and inventory management (Rushton, Croucher & Baker, 2014:3)
Procurement	Is used as a term to identify business processes that involve the buying of goods and services for a business to meet its needs (Interagency Procurement Working Group, 2012:2)
Operations Management	Is the part of the business that controls the transformation of inputs into outputs and can be identified as the production function of a business (Kumar & Suresh, 2009:2).
Pharmaceutical Supply Chain	Term used to identify supply chains that operate within pharmaceutical companies (Xie & Breen, 2012:2)
Sustainability	Refers to reducing wastefulness to maintain natural resources and the environment for the future generations (Baumgärtner & Quaas, 2010:446)
Reverse Logistics	Is a component of logistics and refers to the planning, implementation and controlling of raw materials, in-process inventory, finished goods and related information from the point of consumption back to the point of origin in order to properly dispose of or to recycle outputs (Narayana *et al.,* 2014:380).
ISO 14001	A series of environmental standards that have been created by the International Organisation of Standardisation to improve environmental performance of businesses (Jiang & Bansal, 2003:1047)
Environmental Management Systems (EMS)	Refers to the process of integrating corporate environmental policies and initiatives into businesses (Morrow & Rondinelli, 2002).
Industrial Ecology	The systematic view the world operating as a natural system where businesses are seen as an element of a natural ecosystem (Ayers & Ayers, 2002: 3).

Source: Compiled by researcher (2016)

1.5 PROBLEM STATEMENT

Sustainability has become a core competency for businesses globally (Sheu, Chou & Hu, 2005:288). GSCM is an effective green initiative for incorporating sustainability within a business (Darnall, Jolley

& Handfield, 2008:33). However, in order to implement and maintain a GSCM within a business the factors that affect it must be identified (Dhull & Narwal, 2016:62). As indicated previously, Pharmaceutical Supply Chains are complex and produce harmful by-products from the production of medication (Xie & Breen, 2012:2). Implementing and maintaining GSCM within pharmaceutical companies is costly and difficult (Faisal, 2015:2). Little research has been carried out within South African pharmaceutical companies that identify the factors that negatively affect GSCM initiatives.

1.5.1 Research Questions

Within this context, the following research questions were formulated:

1. How does GSCM function within the planning, procurement, and logistics departments at Cipla Medpro?
2. What are the factors that affect GSCM in the planning, procurement and logistics departments at Cipla Medpro?
3. What are the procedures Cipla Medpro has in place to overcome the factors that negatively impact on GSCM in the planning, procurement and logistics departments?
4. If there are procedures in place, can you provide insight into these procedures?

1.5.2 Research Objectives

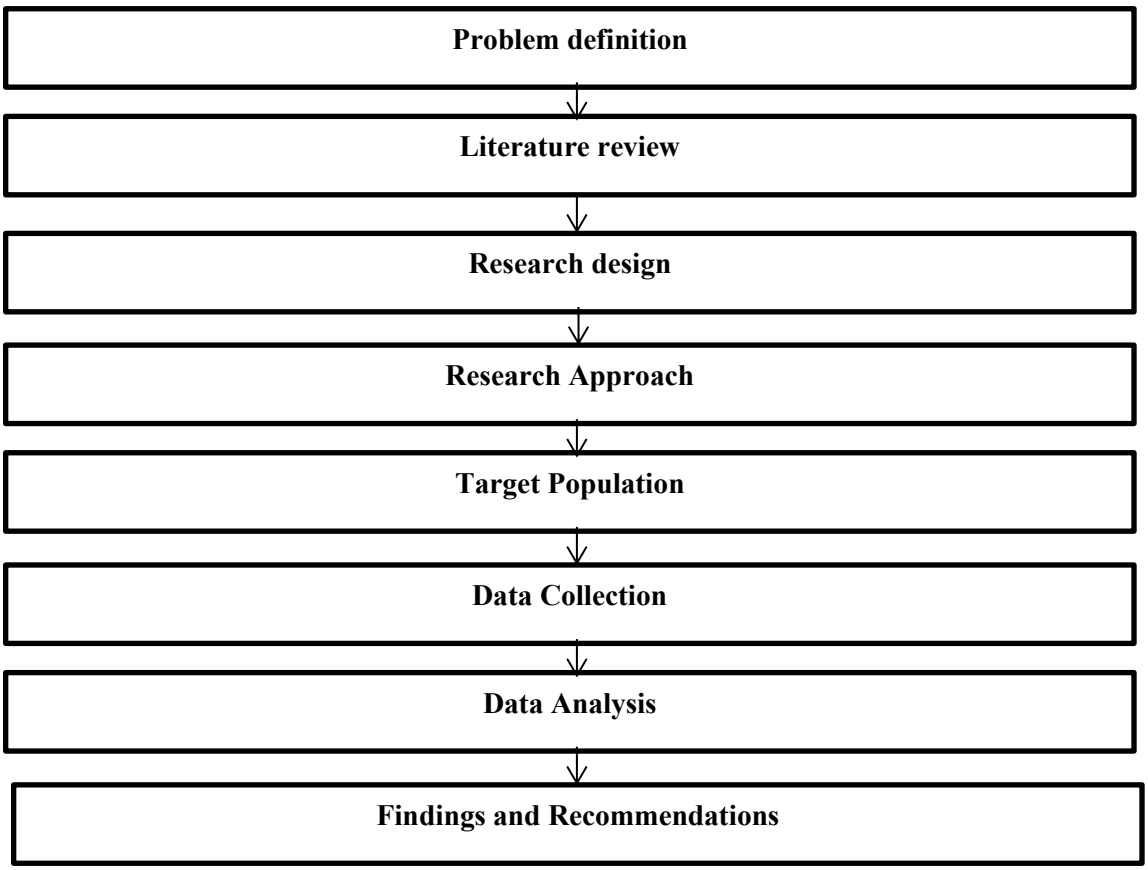
In order to answer the research questions, the research objectives of this study are outlined as follows:

1. To provide insight into the GSCM initiatives in the planning, procurement, and logistics departments at Cipla Medpro.
2. To identify the factors affecting GSCM initiatives in the planning, procurement and logistics departments at Cipla Medpro.
3. To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on GSCM in the planning, procurement, logistics departments.
4. If Cipla Medpro has such procedures in place, to provide insight into the various procedures they have in place.

1.6 RESEARCH METHODOLOGY

The primary data for this study was gathered from semi-structured interviews. The secondary data was gathered from various sources such as journals, text books and articles. Information on the target company was gathered from the company website. This study uses various sources of data in order to get a holistic view of the target company. The research process followed in this study is outlined as follows:

Figure 1.1: Research Process



Source: Sekaran & Bougie (2013:49)

1.6.1 Research Design

This study is descriptive and exploratory. An exploratory study is a study that is conducted when not much is known about the subject at hand (Bougie & Sekaran, 2013:96). Exploratory studies are undertaken to improve the understanding of the nature of the problem when not many studies have been conducted to answer the questions of the proposed study (Bougie & Sekaran, 2013:96). Exploratory studies are also necessary when facts are known but there is a need to gather more information to create a viable theoretical framework (Bougie & Sekaran, 2013:96). A descriptive study was undertaken to identify and describe the characteristics of variables of focus within a study. The purpose of a descriptive study is to describe the relevant aspects of the occurrence of interest from an individual,

organisation or other perspective (Ghauri, 2004:15). Therefore, this study is both descriptive and exploratory because the aims of the study were to explore the factors that affect GSCM initiatives within Cipla Medpro Manufacturing as well as to identify and describe these factors.

1.6.2 Research Approach

This study adopted a qualitative, case study research approach because the study aimed at identifying the factors affecting GSCM initiatives. Qualitative data is data in the form of words (Myers, 1997:3). Qualitative research can come from a variety of sources such as government publications, individuals and focus groups, to name a few (Bougie & Sekaran, 2013:337). Some of the benefits of qualitative research are:

1. Assists the researcher to understand the characteristics of a group in a given situation (Taylor, Bogdan & DeVault, 2015:8). Creates openness thus allowing for a variety of answers and a better understanding of the subject or occurrence (Bougie & Sekaran, 2013: 337).
2. Aspects that are not identified in quantitative research such as the culture of an organisation can be identified and measured to give a more realistic and holistic study (Ulin, Robinson & Tolley, 2012:4).
3. The data acquired from qualitative research is dependent on human experience and is therefore more in-depth than data gathered through quantitative research methods (Taylor *et al.,* 2015:9).

The interview method that was used to gather data for the study consisted of semi-structured interviews. Semi-structured interviews focus on a specific theme but discusses them in a conversational style (Raworth, Sweetman, Narayan, Rowlands & Hopkins, 2012:1). A semi-structured interview is also used when the interviewer knows what information is required but wants to probe deeper into a phenomenon or occurrence (Gelletta, 2013:37).

1.6.3 Target Population

The target population included the SCM staff at Cipla Durban branch. Supply chain staff from three departments which are the planning, procurement and logistics department were included in this study. A total of 10 staff members across the three operational areas participated in this study. This is because these departments were identified as essential departments in the implementation of GSCM. In order to ensure that data is reliable and contains only information that is pertinent, only the most relevant departments were included (Pertamin Hulu Energi, 2012: 5-6). Departments that have smaller less influential roles were omitted from the target population.

The Cipla Durban branch also sources its raw materials from various countries including depots in India. This means that the supply chain staff at the Durban branch must be incorporated within business

operations and be highly skilled in order to successfully carry out the objectives of its robust supply chain. Therefore, participants must be integrated within Cipla and must have a sound understanding of SCM.

1.6.4 Participants

For the proposed study all the personnel in the procurement, planning and logistics departments at the Cipla Durban branch were interviewed because the number of individuals in these respective departments is small. This ensured a more accurate outcome of the study as all the individuals provided their inputs. The participants are outlined in table 1.3:

Table 1.3: Participants

Department	**Number of individuals working in respective department and selected for the study**
Planning	1
Procurement	5
Logistics	4
Total	**10**

Source: Compiled by researcher (2016)

1.6.5 Selection Techniques

A non-probability purposive judgement sampling (Beri, 2013: 197) was used to select the departments. In this selection technique, all the elements in a population do not have even probabilities to be chosen as sample subjects because only information from specific individuals is needed for the research. According to Bougie and Sekaran (2013:252), non-probability purposive sampling is used when sampling is restricted to specific groups of people that can provide the desired information to the researcher. The sampling is confined to specific groups of individuals because only these individuals have the required information for the study. The type of purposive sampling used in this study was judgement sampling (Beri, 2013:197). Judgement sampling involves a choice of subjects that are in the best position to provide the information required (Beri, 2013:197). Judgement sampling is used when a limited number of people have the information that is sought by the researcher (Bougie & Sekaran, 2013:252).

The reason for the use of this technique is because only personnel with the relevant information would be required in the study, namely, SCM staff. For this study the supply chain department has been segregated into different departments, namely, Procurement, Planning and Logistics. From these groups all personnel were included to participated in the study (a census sample). This is because (1) the

number of personnel in the respective departments is small; and (2) these individuals have expert knowledge and have gone through experiences that provide important data for the study.

1.6.6 Data Collection

Semi-structured interviews using a semi-structured interview guide was used to collect the primary data. The reason for the use of this instrument was because it allowed the study to be conducted by keeping the questions limited to only those that would be of value to the study (Flick, von Kardoff & Steinke, 2004:268). The interview guide consisted of open-ended questions (copy included as Appendix B).

1.6.7 Data Quality

The accuracy of this study was ensured by using Guba's model of trustworthiness. His model outlines four aspects of trustworthiness, namely, credibility, dependability, transferability and conformability (Guba, 1981:80).

Credibility is aligned with internal validity (Shenton, 2004:64). Credibility ensures that the study is able to measure what it was established to study. Incorporating credibility is an essential factor for instituting trustworthiness (Guba, 1981: 80).

Dependability ensures that the study is reliable (Krefting, 1991:217). This means that if the study was to be repeated in the same context, using the same methods and the same participants the results obtained would be similar (Shenton, 2004:71). Dependability and credibility are closely related to each other (Krefting, 1991:217).

Transferability refers to external validity or generalisability (Guba, 1981:80). Transferability refers to the ability of the proposed study to be applied to other situations (Shenton, 2004:70). It is therefore the responsibility of the researcher to ensure that there is sufficient contextual material about the research area for the reader to make a transfer.

Conformability refers to objectivity of the study (Guba, 1981:80). This ensures that steps have been taken to make the study's findings a result of the participant's ideas and experiences rather than the preferences of the researcher (Shenton, 2004:71).

To ensure credibility the researcher incorporated a strategy known as member checking. Participants' answers were summarised and articulated to ensure that it was appropriately understood. To incorporate conformability the interviewer wrote down additional notes during each interview to ensure a deeper analysis.

1.6.8 Data Analysis

Data was analysed using content analysis (Bougie & Sekaran, 2013:352) because the data that would be analysed was from semi-structured interviews consisting of open-ended questions. Content analysis is an observational research method that is used to analyse information from interview recordings, newspapers, websites and similar information sources (Elo & Kyngäs, 2008:108). This method of analysis enables the researcher to analyse data from textual information and its properties (Bougie & Sekaran, 2013:352). This is to identify the presence of certain words, characters, concepts, sentences and themes (Elo & Kyngäs, 2008:108). The answers from the interview were tabulated into meaningful information to identify patterns in information.

In order to do this process, interviews were recorded using a voice recorder. Interviews were transcribed verbatim and then the researcher went through the recordings again to make sure that the data was transcribed accurately. Any data that could not be linked back to the study was discarded. Relevant data was categorised and unitised into themes.

1.7 JUSTIFICATION OF THE STUDY

The deterioration of the environment is becoming an important issue to society and businesses (Kumar & Chandrakar, 2012:1). This can be attributed to the adverse effects that arise from global warming and the scarcity of natural resources (Kumar & Chandrakar, 2012:1). GSCM aims to reduce the carbon foot print of businesses through various upward and downstream initiatives (Crum, Poist, Carter & Easton , 2011:46). Since there are many factors that affect GSCM it is important for businesses to identify these, as they are critical for GSCM to be successful. Past research identifies the importance of GSCM as well as the possible factors affecting it, however, they do not convey this from the perspective of the supply chain staff. Supply chain staff work directly with supply chain activities and they have considerable impact on the operations of a supply chain department (Dalkir, 2005:8).

There is also limited research on the factors that affect GSCM initiatives within pharmaceutical industries in South Africa. Pharmaceutical businesses play a pivotal role in South Africa due to the need for medication to combat epidemics such as HIV/AIDS and tuberculosis (Gandhi, Moll, Sturm, Pawinski, Govender, Lalloo, Zeller, Andrews & Friedland, 2006:1). Pharmaceutical businesses also produce high levels of hazardous waste and have a substantial impact on the environment (Narayana *et al.,* 2014:381). This study identifies the factors that affect GSCM in Cipla Medpro Manufacturing as well as provides insight on whether measures have been put in place to combat the negative effects of these factors.

1.8 DELIMITATIONS AND ASSUMPTIONS OF THE STUDY

The first limitation of the study is that only supply chain staffs were included to participate in the study – disregarding the inputs of the other departments. SCM departments are dependent on other functional areas such as Finance, Marketing and Research and Development. The assumptions taken by the researcher was that the supply chain department would have the most essential information pertaining to GSCM.

The second limitation is that the company of focus is a pharmaceutical company. Thus the factors affecting GSCM may be unique to the pharmaceutical industry and thus findings cannot be generalised to different industries. Therefore the second limitation of the study is that the results of the study may only have relevance to the pharmaceutical industry.

The study is also limited to one company, therefore results will not be widely generalisable between companies. The results of this study are only applicable to the company of study and will have little or no bearing on other companies in the industry.

It was assumed that for this study quality data would be collected through structured interviews as opposed to other methods of data collection. It was also assumed that the use of interview guides would assist participants in providing quality data and also improve the willingness of the participants to do so.

1.9 EXPECTED CONTRIBUTION OF THE STUDY

The expected value of this study is that the findings will contribute to the existing body of knowledge by providing new insights in the field of GSCM. Little or no previous studies dealing with factors that affect GSCM in leading pharmaceutical manufacturers in South Africa have been published.

This study identifies factors that affect GSCM within the planning, procurement and logistics departments. This study further contributes to the body of knowledge by providing suggestions as to how the identified factors that negatively impact on GSCM initiatives could be solved. It is envisaged that the implementation of proposed suggestions could assist other pharmaceutical manufacturers to overcome their particular GSCM challenges. This would enable them to continue to contribute positively towards the sustainability of the natural environment. This study also provides a basis for future researchers to investigate further the factors affecting GSCM in other companies or sectors of the industry.

1.10 ETHICAL CONSIDERATIONS

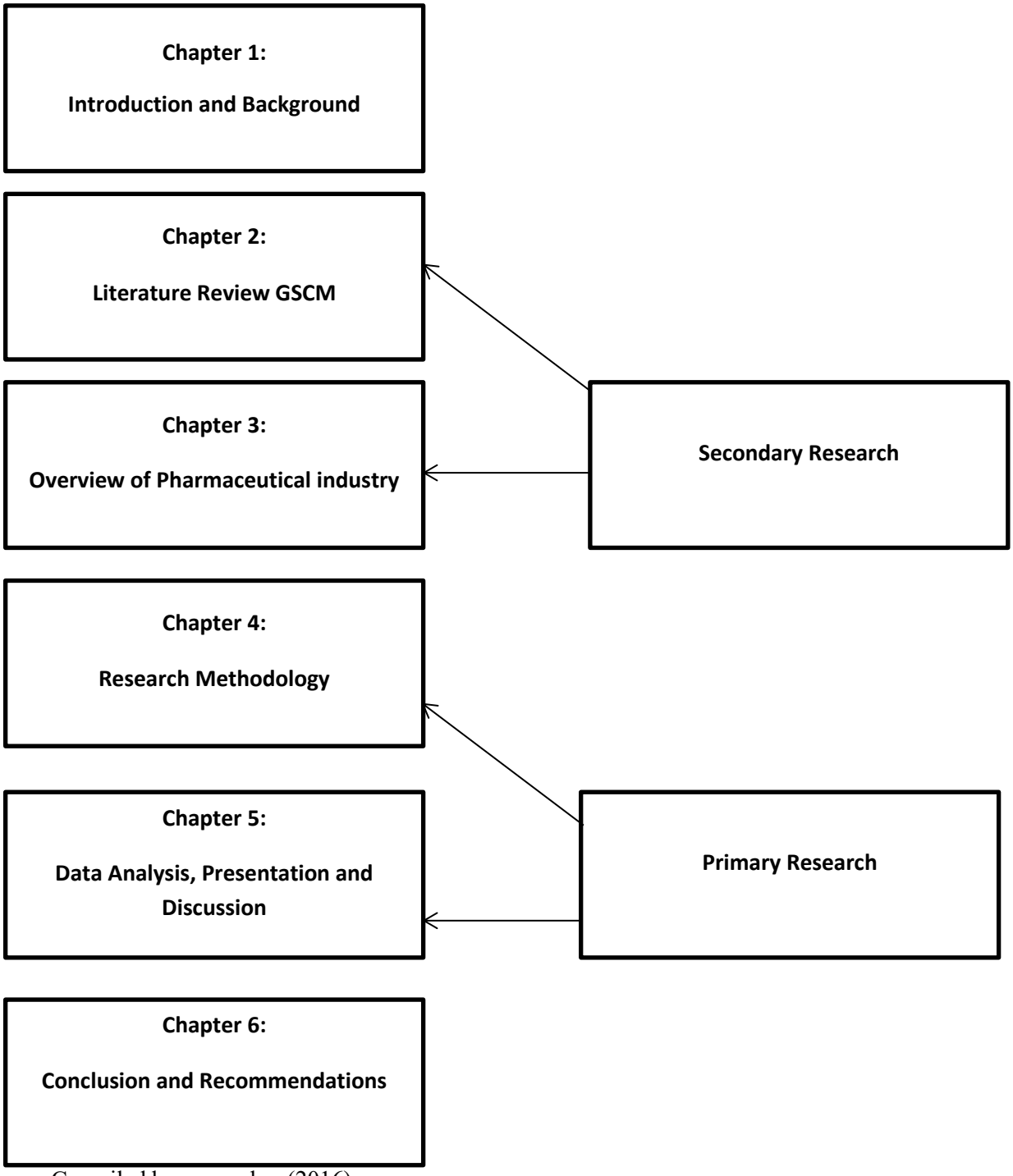
- Ethical clearance was submitted to the University of KwaZulu-Natal (UKZN) to ensure that the study was ethically sound and within current ethical standards. No primary data was undertaken unless ethical clearance had been granted by UKZN. Full ethical clearance was granted and a permission letter was provided. (See Appendix A, full approval granted)
- Before undertaking the interview each participant completed a letter of consent (appendix C) to ensure that they read the terms of the interview and agreed upon them.
- Information acquired from the interviews would not be taken out of context and recordings will be made to ensure data integrity.

1.11 CONCLUSION

This chapter provided the background of the study and touches on key elements. The scope of the study and key definitions that were used were dealt with. The problem statement and objectives of the study were then clearly stated to identify the purpose of the study. A brief overview of the research methodology was then provided, as was the data quality control. This chapter then concluded with the justification of the study, the ethical considerations and an outline of the chapters in this study depicted below.

1.12 OUTLINE OF THE CHAPTERS

Figure 1.2: Depicts the Seven Chapters of this Study



Source: Compiled by researcher (2016)

Chapter 1: Background and Introduction to the Study

This chapter provides an overview of GSCM and pharmaceutical supply chains within South Africa. This is the background to the study. It elaborates on the impact and importance of GSCM within a business and on society. It also gives a brief overview of the research objectives, research questions, hypothesis, methodology, limitations and ethical statement of the study, and summary outlines of the chapters to follow.

Chapter 2: Literature Review - GSCM

This chapter reviews related literature on GSCM. Journals, previous research, websites and textbooks were reviewed in this chapter to identify common factors that affect GSCM initiatives. Links between literature and the research objectives were made and used to develop questions in the interview guide. This chapter also laid the foundation for the study by identifying and explaining GSCM.

Chapter 3: Overview of Pharmaceutical Industry

This chapter focuses on giving an overview of the pharmaceutical industry within South Africa and globally. It also identifies GSCM within the context of the pharmaceutical industry.

Chapter 4: Research Methodology

In this chapter the methods used to conduct this study are identified and explained. Elements such as the research design, sampling strategy and instruments used to gather information in this study is presented. Aspects such as methods used to ensure data validity and reliability is also discussed.

Chapter 5: Analysis, Presentation and Discussion

In this chapter the information obtained in the study is presented and an appropriate conclusion is identified. It identifies the findings that the study has yielded and discusses these findings.

Chapter 6: Conclusion and Recommendations

This chapter concludes the study and provides the recommendations for companies aiming to adopt GSCM practices. Key factors identified in the study are mentioned in improving the adoption of GSCM initiatives. The limitations of the study are also discussed and the focuses of future research in the respective field.

CHAPTER 2:

GREEN SUPPLY CHAIN MANAGEMENT

2.1 INTRODUCTION

Throughout the years environmental degradation has become an area of concern for governments, consumers and businesses (Najam, Runnalls & Halle, 2007:1). In order to combat environmental degradation both developed and developing countries have adopted legislation to reduce environmental impacts of businesses (Dhull & Narwal, 2016:62). In response to the growing needs of environmental compliance supply chains have evolved into GSCM through the incorporation of environmental thinking. Some of the leading features of these environmental trends are the emphasis on life cycle costing, waste reduction, asset efficiency and recycling (Broek, 2010:5). Some examples of prominent companies that have incorporated sustainability into their business strategies are provided as follows:

1) Nestle employed an on-going, company-wide sustainability programme that is focussed on generating substantial environmental and financial benefits (Broek, 2010:5). Their strategy focused on source reduction, energy recovery and recycling (Broek, 2010:5).
2) Acer has reduced its waste and paper consumption by reducing their user manual from 102 pages to 12 and its box size for products by 60% (McCafferty, 2015).
3) Wal-Mart created a sustainability strategy in 2005 aimed at reducing packaging by 5% by the year 2013 (Broek, 2010:5). Wal-Mart expects that the strategy will reduce carbon emissions by 667 000 metric tons (Broek, 2010:5).
4) Dell has incorporated the "Plant a Tree" programme to encourage customers to protect and regrow forests (McCafferty, 2015).
5) Heineken incorporated an "Aware of Energy" programme to reduce fuel and electricity costs by 15% in between the years of 2002 and 2010 (Broek, 2010:5). This helped Heineken of 6% of fuel and electricity costs (Broek, 2010:5).
6) Disney has incorporated initiatives to reduce greenhouse gases through electrical consumption. It also has a zero waste policy meaning that the waste that it generates does not go to landfill sites. Disney also incorporated water saving technologies to reduce its overall water preservation (Ripton, 2014).

From these examples, it is clear that many large companies are integrating sustainability initiatives that have an impact on their supply chains and management thereof (Broek, 2010:5). SCM has been an area of growing interest, with a surge in academic articles and literature since 1990 (Naslund & Williamson, 2010:11). Likewise, sustainability has become a growing concern for businesses, governments and consumers globally (Kumar and Chandrakar, 2012:1). As a consequence, supply chains are under

pressure by governments and consumers to incorporate sustainability in their processes (Kumar & Chandrakar, 2012:1).

The aim of this chapter is to provide insight into GSCM and what factors affect them as well as how supply chains can be used as a tool for incorporating sustainability. Therefore, this chapter is a theoretical discussion of GSCM. The chapter concludes by presenting a list of questions, included in the interview guide to be used for the primary data collection phase of this study.

2.2 AN OVERVIEW OF SUPPLY CHAIN MANAGEMENT

SCM is an important component of businesses across the world (Monczka *et al.,* 2010:6). SCM integrates topics from areas such as manufacturing operations, purchasing, transportation and physical distribution (Zigiaris, 2000:3). It is involved with essential business processes such as procurement, logistics, reverse logistics and operations management (Hugos, 2011:2). Rouse (2010) identifies SCM as the flow of materials, financial resources and information between processes from the supplier to the manufacturer, to the wholesaler/distributors and retailer and finally to the end customer. It therefore involves the coordination of the flow of materials and operations both internally and externally from an enterprise (Rouse, 2010). Supply chains are constantly evolving to face the continuously changing business environment (Najam *et al.,* 2007:5). Different types of supply chains have emerged throughout the years such as lean, hybrid, agile, standard, and green supply chains (Nelson, Marsillac & Rao, 2012:34).

2.2.1 Definition of Supply Chain Management

SCM is a word that has been used and defined by various academic texts. The reason for this is because the description and scope of SCM varies between businesses and evolves with the changing economic climate (Stock & Boyer, 2009:692). Some definitions focus on supply activities whilst others emphasise the flow of materials and inter-organisational relationships (Stock & Boyer, 2009:692). Some SCM definitions are provided as follows:

According to Monczka *et al.* (2010:6), SCM is an upstream movement of resources from suppliers and the downstream movement of goods to the final customers. SCM is also seen as the integration of business processes from the initial suppliers that provide the product, information and service right through to the end user through value adding processes (Croxton, Garcia-Dastugue, Lambert & Rogers, 2001:13). Simchi-Levi (2002:1) states that SCM is a set of methods that are utilised to integrate suppliers, warehouses, manufacturers and stores efficiently so that products are produced and distributed in the correct quantities, to the right locations, at the right time, to minimise costs and to meet business requirements.

For the purpose of this study, a definition by the Council of Supply Chain Management Professionals (CSCMP) was used to define the boundaries of SCM. The Council of Supply Chain Management Professionals defines SCM as:

"*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"*

(Council of Supply Chain Management Professionals, 2016: Internet).

Authors such as Stock and Boyer (2009), Naslund and Williamson (2010) and Luo (2013) state that this definition is an accurate representation of SCM.

2.2.2 Supply Chain Management as a Key Business Process

SCM is a critical business process in many businesses (Monczka *et al.*, 2010:6). It can be compared to an umbrella that covers key business processes such as management of materials from the point of origin to the point of consumption including all sub-process (Stock & Boyer, 2009:702). A report generated by Accenture in cooperation with Instead and Stanford report that 89% of executives surveyed identified SCM as a critical business process (Naslund & Williamson, 2010:11). According to Naslund and Williamson (2010:11), the recent interest in SCM is due to organisations becoming reliant on efficient and effective supply chains to compete in global markets. This is due to the fierce competition that businesses face in today's global markets in which products experience shorter life cycles and customers have higher expectations from products (Simchi-Levi, 2002:1). Pressure from advancement in technology and transport have also placed pressure on businesses and highlight the importance of SCM by making suppliers from different geographic locations more easily available (Simchi-Levi, 2002:1).

In South Africa, SCM in the public sector has also been growing in importance (Republic of South Africa National Treasury, 2015:3). This is due to the South African government remodelling cost structures to minimise costs after the 2008 recession had placed them with large amounts of debt (Republic of South Africa National Treasury, 2015:3). The South African government identified SCM as a key operational area that has a direct impact on business efficiencies (Republic of South Africa National Treasury, 2015:4).

SCM is important because it is integrated with business operations and therefore affects the way a business operates and its competitive advantage. According to Pienaar and Vogt (2013:23), getting products to customers faster than competitors will improve a business' competitive edge and overall

performance. SCM has precedence over transport management and therefore inbound and outbound transportation (Pienaar & Vogt, 2013:8). This means that SCM can directly affect movement of goods and delivery time (Stadtler & Kilger, 2000:2). Similarly because SCM is integrated with various business operations and business areas it affects how other functional areas operate.

2.2.3 Roles of Supply Chain Management

SCM encompasses various business processes and roles. These roles are integrated business processes that have a direct impact on functional areas such as marketing, finance, production, research and development and production (Croxton *et al.,* 2001:13). Some of the most commonly identified SCM processes are procurement, logistics, operations management and warehouse management. According to Zigiaris (2000:5), the role of SCM has evolved over the years – the most common roles are: inventory management; materials handling; transport service procurement; warehouse management; inbound transportation and outbound transportation; and operations management. Mentzer, Stank and Esper (2008:6) state that SCM is the coordination of relational, physical, informational and financial flows to match a business' demand with supply. However, SCM has evolved to also include operations such as order processing, SCM budget forecasting, sales forecasting and master production planning (Zigiaris, 2000:5). Therefore it is evident that the role of SCM is continuously evolving and changing.

Croxton *et al.* (2001:14) state that there are eight roles of SCM that are common across businesses globally. The eight roles are:

1. customer relationship;
2. order fulfilment;
3. customer service management;
4. demand management;
5. returns management;
6. product development;
7. supplier relationship management; and
8. manufacturing flow management.

Croxton et al. (2001:14)

Therefore SCM can be seen as a complex network of operations and functional areas (Simchi-Levi, 2002:4).

Stock and Boyle (2009:703) identify that role of SCM is to serve as an interface between the business, customers, suppliers and stakeholders. Its role is as a facilitator and coordinator for business relationships (Stock & Boyle, 2009:703). The next section provides an overview of the functional departments of SCM.

2.3. FUNCTIONAL DEPARTMENTS OF SCM

Academics and SCM professionals constantly contend the boundaries of SCM and which functional departments it comprises of (Anderson, Britt & Favre, 2010; Simchi-Levi, 2002; Naslund & Williamson, 2010; Croxton *et al.,* 2001; Zigiaris, 2000). This is due to the continuous evolution of SCM and the multiple roles that the SCM department has within a business (Croxton *et al.*, 2001:14).

Since this study uses the definition set by the CSCMP for SCM it also uses the boundaries that it sets for SCM to define the operational departments of SCM. CSCMP states that

"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 is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It also includes manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance, and information technology".

Council of Supply Chain Management Professionals (2016: Internet)

From the definition given by Council of Supply Chain Management Professionals three departments have been isolated as key SCM departments, namely operations management, logistics and procurement management (Council of Supply Chain Management Professionals, 2016). These departments are explained and form the foundation to better understand SCM and guide the study.

2.3.1 Operations Management

According to Porter (2009:7), operations management is the management of the way a business produces or delivers the goods and services that it provides to consumers. Therefore all businesses have an operations management department (Porter, 2009:7). Slack, Chambers and Johnston (2010:1) state that operations management can be found in all departments and not confined to operations management. All managers in all departments that coordinate operations are part of the operations management department as a whole (Slack, Chambers & Johnston, 2010:1). For the purpose of this study a definition by Kumar and Suresh (2009:2) was used to identify the boundaries of operations management. Kumar and Suresh (2009:2) state that operations management is the part of the business that controls the transformation of inputs into outputs. Therefore operations management can be identified as the production function of a business.

The operations within a business can be categorised into manufacturing operations and service operations (Kumar & Suresh, 2009:7). This is determined by whether a business is service provider, manufacturer or hybrid (Slack, Chambers & Johnston, 2010:1). Manufacturing businesses manufacture physical goods that are tangible and can be stored as measurable inventory (Porter, 2009:7). Service business produces items that are intangible but add value or benefit to the customer (Porter, 2009:7). Table 2.1 depicts the roles of operations management.

Table 2.1: Role of Operations Management

Function	Roles
Operations Management	• The Manufacturing and production functions • Maintenance, repair, and operations (MRO) • Product/service design • Quality

Adapted from: Mentzer et al.(2008:35)

Operations managers are concerned with planning, organising and controlling the activities within a business (Kumar & Suresh, 2009:8). The operations function of a business is thus involved with all parts of a business and therefore has a major impact on the competitive position of a business (Porter, 2009:9). It also plays an important role in the development of a business strategy, because it controls production and therefore the quality, speed of delivery and costs of a business's goods or services (Porter, 2009:11). Therefore operations management can be identified as a critical business process for all business (Kumar & Suresh, 2009:8).

2.3.2 Logistics as a Component of SCM

There is no single region in the world that can provide all the products that everyone requires, therefore resources and products need to be imported from different geographic regions (Pienaar & Vogt, 2013:1). This is where the role of logistics comes in. Logistics is the transport, storage and handling of materials from point of origin to point of destination and final consumption (McKinnon, Browne, Whiteing, & Piecyk, 2015:3). Rushton *et al.* (2014:3) identify the components of logistics as transport, warehousing and inventory management. Logistics and SCM are not the same as logistics falls under the authority of SCM rather than a partnering department (Rushton *et al.,* 2014:3).

Table 2.2: Roles of Logistics Management

Function	Roles
Logistics	• Materials Management • Distribution • Warehousing technique • Transportation network design and management • Warehousing techniques • Materials handling management • System wide inventory management

Adapted from: Rushton et al. (2014:4); Mentzer et al. (2008:34)

From table 2.2, it is clear that logistics is a component of SCM. Logistics is one of the most critical activities in modern societies (Ghiani, Laporte & Musmanno, 2004:1). This is due to the fact that logistics makes extensive use of material and human resources on a scale that impacts national economies (Rushton *et al.,* 2014:9). In 1997 the total logistics costs incurred by the United States of America (USA) was 862 billion dollars, this was approximately 11% of the USA's Gross Domestic Product (Ghiani *et al.,* 2004:1). A study in the United Kingdom revealed that approximately 30% of the working population is associated with work related to logistics (Rushton *et al.*, 2014:10). One of the reasons for this is that logistics is a part of all three levels of business namely, operational, tactical and strategic (Simchi-Levi, Chen & Bramel, 2013:3). Therefore, it can be concluded that logistics is a critical component of SCM.

2.3.3 Procurement as a Component of SCM

Procurement is constantly evolving from a business and conceptual context (Thai, 2009:2). In simple terms procurement can be seen as the act of buying goods and services. The terms purchasing and procurement are often used interchangeably because of the close relation between the two in a business context (Andreasen, 2012:17). According to the Interagency Procurement Working Group (2012:2), procurement refers to the acquisition of goods and services to meet businesses requirements. Novack & Simco (1991:145) on the other hand, state that procurement is a complex process that is difficult to define as it includes all the processes and sub-processes that affect the acquisition of goods and services that a business requires. Bloch (2011:8) posits that there are two types of procurement, namely, direct and indirect procurement. Direct procurement is involved with all purchasing activities that are required in the manufacturing of a business's product, whilst indirect involves the purchasing of other products and services needed by the business in general (Bloch, 2011:8).

There are many aspects that buyers need to take into consideration before they initiate the purchasing activity (Interagency Procurement Working Group, 2012:2). Some of the deciding factors of procurement are the trade-offs between quality, timeliness, cost efficiency and risk (Thai, 2009:2). Other external factors that directly affect procurement are market prices, stocks and the economic environment (Andreasen, 2012:27).

2.4 INTRODUCTION TO GSCM

GSCM is becoming an increasingly popular practice for business globally that are trying to improve their environmental performance (Testa & Iraldo, 2010:953). According to Zsidisin and Siferd (2001:69) ,GSCM is "*the set of supply chain management policies held, actions taken and relationships formed in response to concerns related to the natural environment with regard to the design, acquisition, production, distribution, use, re-use and disposal of the firm's goods and services*". Pressures created from both internal and external factors have forced businesses globally to adopt GSCM practices (Kumar & Chandrakar, 2012:1). Diminishing resources and increases in natural disasters are some of the many factors that force businesses to improve their environmental sustainability (Zhu *et al.,* 2007:1043). Carbon emissions that arise from supply chain activities produce environmental problems such as acid rain and global warming (Kumar & Chandrakar, 2012:1).

2.4.1 What is meant by "Green"

The term "going green" means to incorporate environmentally friendly practices into a business function or to improve the sustainability of the environment through practices that have a reduced negative effect on the climate and environment as a whole (Kumar & Chandrakar, 2012:1). According to Griskevicius *et al.* (2010:393), going green can be seen as a strategic shift for a business to improve pollution control to pollution avoidance. "Going Green" can also be identified as the development of environmentally friendly products, services and business processes that reduce a business's overall negative impact on the environment (Green, Zelbst, Meacham, & Bhadauria, 2012:290).

Green activities have been gaining popularity in society. According to Griskevicius *et al.* (2010:393), people essentially care about the planet and its inhabitants and the destruction or damage of the earth is frowned upon by society. Therefore the global movement towards "green" could be seen as being ethical (Testa & Iraldo, 2010:953). The green movement can be as a result of the social, environmental or economic impact of environmental degradation.

2.4.2 GSCM Definition

The concept of GSCM appeared in the late 1990s, and involves the monitoring of environmental management programmes, the incorporation of green practices such as the recycling, remanufacturing and reverse logistics as well as other green innovations within a business' supply chain (Mugabe, 2013:2). The difference between SCM and GSCM is the difference in environmental concern (Dhull & Narwal, 2016:62). GSCM can also be seen as the incorporation of environmental practices into supply chain activities which include, but are not restricted to green procurement, green logistics and green operations management (Zsidisin & Siferd, 2001:68-69). GSCM involves a set of environmental initiatives that enforce the improvement of environmental practices between businesses operating within the same supply chain. Greening supply chains can also be identified as a supply chain's ability to balance marketing performance with environmental issues, in order to reduce challenges facing the environment such as pollution reduction and energy conservation (Kumar & Chandrakar, 2012:1).

Darnall *et al.* (2008:33) state that GSCM extends throughout the entire value chain from the supplier to the buyer. The overall aim of GSCM is to reduce the environmental impact that a business has on the environment and therefore consists of both direct and indirect impacts. GSCM begins at the product design phase, to the end of the products useful life and finally at the product disposal or recycling phase, by taking environmental impact into consideration at each step of the supply chain (Dhull & Narwal, 2016:62). Table 2.3 shows the impact that supply chains have on the environment both directly and indirectly.

Table 2.3: Direct and Indirect Impacts of Supply Chains on the Environment

Direct Environmental Impacts from supply chain's	Indirect Environmental Impacts from supply chain's
Waste generated from inputs and businesses first tier suppliers: • Transportation • Product Storage • Processing • Product use • Disposal of production by-products	Generated from an businesses second tier suppliers or consumers: • Production waste • Usage waste • Disposal

Source Darnall et al. (2008:33)

2.5 THE EVOLUTION OF SUPPLY CHAIN MANAGEMENT INTO GSCM

GSCM has become an area of focus as of recent due to the driving forces of sustainable business operations (Kumar & Chandrakar, 2012:1). Traditional supply chains focussed mainly on cost, product variety and efficiency with very little regard for the environmental impact (Nelson *et al.,* 2012:36). The emergence of GSCM has been largely due to government regulations which result in penalties and taxes on businesses (Nelson *et al.,* 2012:36). This created a need for businesses to make environmentally sound decisions within supply chains and thus shifted planning from reacting to environmental issues when they occur to creating preventative measures before they occur (Nelson *et al.,* 2012:36). Table 2.4 presents the evolution of GSCM from 1960 to 2016.

Table 2.4: The Evolution of GSCM

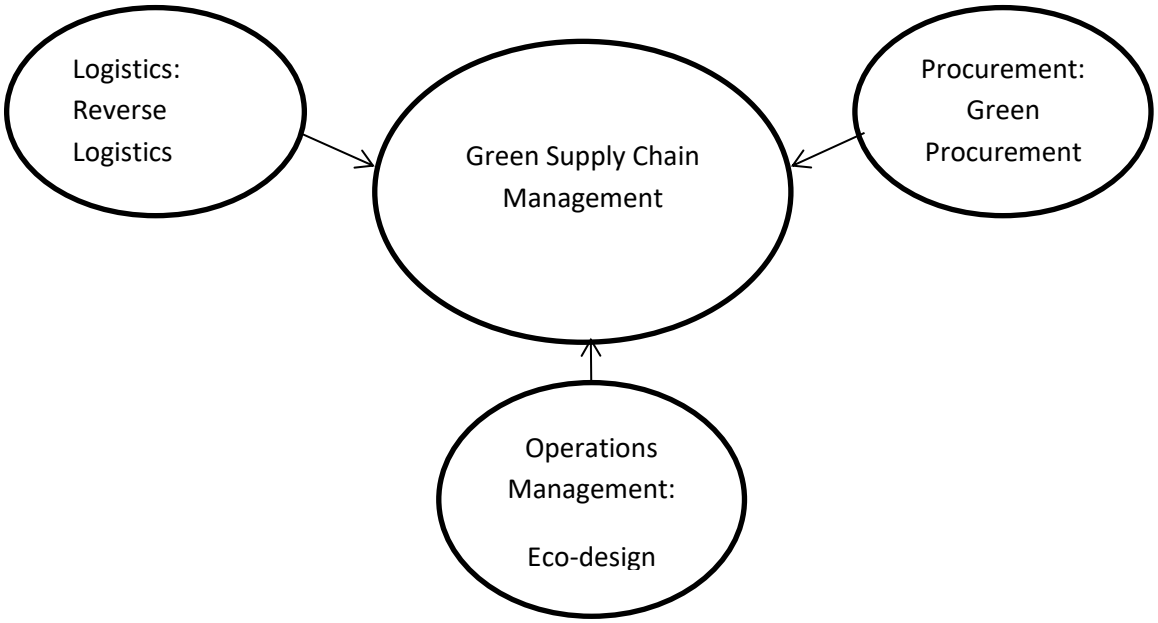
Year	Contributing events	Source
	Companies deny the negative effects of supply chains on the environment.	Georgiadis and Besiou, 2008
	The introduction and rise of corporate social responsibility.	Carroll, 1999
	Awareness of environmental concerns in relation to logistics and transportation starts to grow.	Chunguang, Xiaojuan, Kexi and Pan, 2008
	Brundtland Report was published	World Commission on Environment and Development (WCED), 1987
	Change from local optimisation to supply chain optimisation.	Linton, Klassen and Jayaraman, 2007
	Environmental impacts drive green logistics within companies.	Chunguang *et al.*, 2008
	The theory of green supply chain is defined.	Srivastava, 2007
	The Council of Logistics Management releases its first definition of reverse logistics.	Brito and Dekker, 2003
	Logistics is viewed as a tool for developing a competitive advantage.	Rutner and Langley Jr., 2000
	Early work is published in 2002 containing Total Bottom Line sustainability in supply chain.	Seuring and Müller, 2008
2010	Sustainability is incorporated into business management.	Teuteberg and Wittstruck, 2010
	Research works are published on the integration and management of GSCM.	
2011	The concept of risk management is covered in the sustainable supply chain.	Wolf, 2011
2012	GSCM practices become prevalent among businesses. Companies within the private sector start using purchasing and supply to minimise environmental, economic and social impact.	Walker, Di Sisto and McBain, 2008
2013	In-depth literature reviews on various fields of SCM are available: closed-loop supply chains green supply chains, reverse logistics and SSCM.	Seuring, 2013
2014 till 2016	The importance of environmental factors and social aspects in supply chain management (SCM) becomes a significant focus area for academic researchers and practitioners.	Brandenburg, Govindan, Sarkis and Seuring, 2014

Source: Adapted from Van Rensburg (2015:30).

2.6 THE ROLES OF SUPPLY CHAIN FUNCTIONAL DEPARTMENTS IN IMPROVING SUSTAINABILITY

The three departments of SCM that this study focuses on is logistics, procurement and operations management. Figure 2.1 highlights some of the key aspects of each department that affect GSCM. The roles of the functional departments of SCM include, but are not limited to those mentioned in figure 2.1.

Figure 2.1 Some of the Key Roles of Supply Chain Functional Departments in GSCM



Adapted from Narayana et al., (2014), Sellitto, Bittencourt and Reckziegel (2015), Zsidisin and Siferd (2001) and Kumar and Chandrakar (2012).

2.6.1 Reverse Logistics as a Component of Logistics

According to Narayana *et al.* (2014:380), reverse logistics is the backward movement of goods from point of consumption to point of origin. This includes the management of returns, recycling, reuse and remanufacturing which are all aspects that influence a business' sustainability (Narayana *et al.,* 2014:380). The function of reverse logistics is to close the loop of supply chain activities (Sellitto *et al.,* 2015:4). Reverse logistics is a component of logistics and therefore makes logistics an area of focus for this study.

2.6.2 Green Procurement/Purchasing as a Component of Purchasing

The purchasing function has an influential role on a business' overall sustainability (Zsidisin & Siferd, 2001:61). This is because of its strategic role of influencing its partners in its trading relationship to be more environmentally responsible and to acquire environmentally friendly products for direct and indirect use in operations (Zsidisin & Siferd, 2001:61). Green purchasing includes aspects such as vendor management, vendor selection, vendor evaluation and reward policies to improve vendor

environmental performance (Sellitto *et al.,* 2015:4). Green procurement is a component of the procurement department and as such is another area of focus for this study.

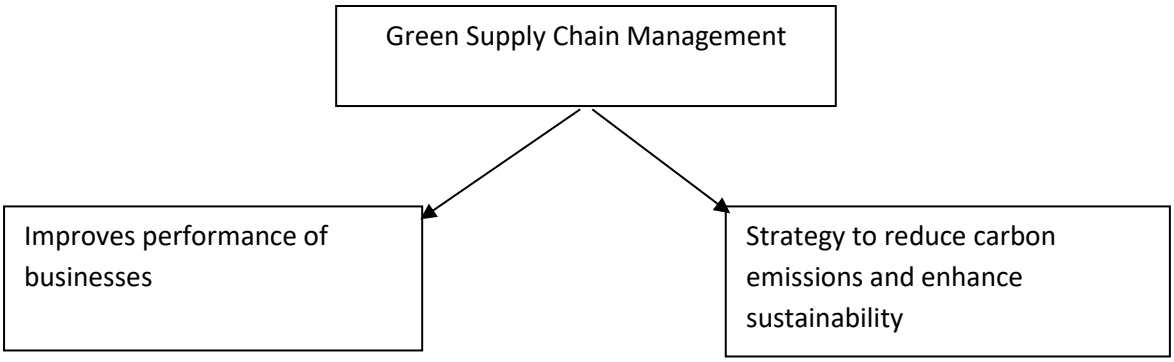
2.6.3 Eco-Design as a Component of Operations Management

Eco-Design is the management of environmental issues such as product life cycle management, analysis of new products and services (Sellitto *et al.,* 2015:4). Eco-design is an important role of sustainable practices as it directly impacts the build of a product and research and development to improve sustainability (Kumar & Chandrakar, 2012:4). Eco-design has been identified as the future of GSCM practices by the U.S Environmental Protection Agency. Eco-design is an aspect of planning which is a functional department of the operations management department (Kumar & Chandrakar, 2012:4). As a result the planning department is an area of focus for this study.

2.7 THE VALUE ADD IMPLICATIONS OF GSCM INITIATIVES ON A BUSINESS

Dashore and Sohani (2013) and Testa and Iraldo (2010) propose that the purpose of GSCM is to improve businesses environmental performance. Figure 2.2 presents GSCM as a great initiative to improve the environmental performance of businesses.

Figure 2.2: GSCM as a Method to Improve Environmental Performance



Source: Dashore and Sohani (2013:2021-2022)

2.7.1 GSCM Improves Business Performance of Businesses

GSCM focuses on the improvement of sustainability from the product design stage therefore it builds up environmental sustainability thus reducing the need from costly rework along the supply chain. Since GSCM aims at reducing, reusing and remanufacturing it also improves the business's return on investment and reduces costs such as government taxes. Wastage reduction through GSCM happens

throughout a products lifecycle therefore it is a holistic approach to reduce costs and improve performance. Consequently, it is a great tool to improve business performance (Dashore & Sohani, 2013:2021).

Testa and Iraldo (2010) identify three key value add implications of GSCM initiatives:

1. Reputation improvement - Businesses improve their overall reputation by adopting GSCM initiatives as it proves to governments and consumers that the business cares about society and nature and not just profits. This will increase brand loyalty and competitive advantage.
2. Innovation improvement - GSCM leads to innovation of products and processes. Innovation leads to unique products and processes that allow a business to enter new market niches or improve the business' position in an industry and widen the gap between a business and its competitors.
3. Efficiency improvement - The implementation of GSCM initiatives can improve the use of business resources through the use of cheaper raw materials, reuse of materials, reduction in packaging costs and transport costs. These benefits can be realised in the long and short term of a business' bottom line.

Testa and Iraldo (2010:954)

2.7.2 GSCM as a Strategy to Reduce Carbon Emission and Enhance Sustainability

As can be seen from figure 2.1, GSCM is a strategy to improve a business's environmental performance and enhance its overall sustainability. This is because it can initiate sustainability from the initial stages of a products life through vendor management and all the way to the end of a products lifecycle through reverse logistics or disposal. Pre-determined standards can be set, so that suppliers are required to meet environmental requirements. Likewise, GSCM controls reverse logistics, which is a key aspect in the reduction of pollution. Therefore if a business incorporates GSCM as a strategy for environmental management it will reduce carbon emissions and enhance sustainability from beginning to end of a business' processes (Dashore & Sohani, 2013:2021).

2.8 THE NEGATIVE EFFECTS OF GSCM ON BUSINESSES

Factors that positively affect certain businesses can also negatively impact other businesses depending on which industry they operate in, country and competitive situation. One of the most common shortfalls of GSCM initiatives is that of the high cost implications that are involved with new technology, different raw materials and high reverse logistics costs (Sellitto *et al.,* 2015:2). These cost implications can have a negative effect on customer demands and competitive advantage (Seuring & Müller, 2008:1703). If a

business operates in an industry in which low cost products are more responsive than sustainable products then the business will lose customers to competitors (Seuring & Müller, 2008:1703). This will have a negative effect on a business' profit margins. GSCM can also have a negative effect on a business depending on its size. Larger organisations find it easier to implement GSCM initiatives as opposed to Small to Medium Enterprises (SMEs) (Van Rensburg, 2015:8). This is because larger organisations have strong financial backing unlike SME's (Van Rensburg, 2015:8). As a result SMEs are at a risk of investing financial capital into GSCM initiatives that do not have high returns on investment (Van Rensburg, 2015:8-9). This could put strain on SMEs and result in the downfall of these businesses during their initial stages.

2.9 FACTORS THAT AFFECT GSCM INITIATIVES

Tables 2.5 and 2.6 list the authors who identify various factors affecting GSCM initiatives. The factors have been split into two groups namely internal and external factors. A tick represents which aspect each author identifies as a factor.

2.9.1 External Factors

External factors are factors that operate outside the businesses boundaries but still have an impact on business initiatives such as GSCM initiatives. These factors are listed in table 2.5. and an explanation is provided of each.

Table 2.5: External factors that affect GSCM initiatives

Authors	Suppliers	Government and Policy Regulation	Market/ Consumer	Competitors	Social	Inbound Logistics	Outbound Logistics
Dukes (2002)	✓	✓					
Zhu, Sarkis and Geng (2005)	✓	✓	✓	✓			
Khiewnavawongsa and Schmidt (2013)	✓	✓	✓				
Walker *et al*. (2008)	✓	✓	✓	✓	✓		
Liu, Yang, Qu, Wang, Shishime and Bao (2012)		✓	✓				
Sari (2012)		✓	✓				
Lin (2013)		✓			✓		
Routroy (2009)		✓	✓				
Lee and Klassen (2008)		✓	✓				
Vachon (2008)							
Kumar and Chandrakar (2012)		✓			✓	✓	✓

Source: Adapted from Kamolkittiwong and Phruksaphanrat (2011:865)

2.9.1.1 Suppliers

Suppliers have considerable impact on GSCM initiatives. Their effect can either have a positive or negative effect. Suppliers should be environmentally compliant, meaning that they should have a certified environmental management system (Diabat & Govindan, 2011:663). If suppliers are environmentally compliant, the buying company can implement environmental purchasing (Zhu *et al.,* 2005:453). Environmental purchasing or green purchasing is a term used to identify purchasing from environmentally responsible sources (Walker & Brammer, 2009:128). This will facilitate for businesses to provide design specifications to suppliers to build sustainability into products (Zhu *et al.,* 2005:453). However, suppliers could oppose environmental collaboration and thus be detrimental to the GSCM initiatives due to misalignment of goals and conflict (Diabat & Govindan, 2011:663). A lack of communication with suppliers can also have a negative effect on GSCM initiatives as goals between the supplying firm and the buying firm can become misaligned and focus on opposing goals (Khiewnavawongsa & Schmidt, 2013:227).

2.9.1.2 Government and Policy Regulation

Government regulations have been institutionalised by governments to combat issues that arise from the degradation of the environment (Lee & Klassen, 2008:575). Issues such as climate change, irregular weather patterns and water scarcity are all results of pollution (Kumar & Chandrakar, 2012:5). Therefore governments had to incorporate laws and regulations to help reduce environmental degradation through the reduction of greenhouse gases and carbon emissions (Kumar & Chandrakar, 2012:5).

Government regulation has a considerable impact on GSCM initiatives as it puts pressure on businesses to meet government targets or often face fines and other penalties (Lee & Klassen, 2008:575). Businesses will not spend any more than is necessary to maximise their economic goals, on environmental sustainability issues (Diabat & Govindan, 2011:661). A lack of government regulations has a negative impact on GSCM initiatives as it is a key driver of GSCM initiatives (Khiewnavawongsa & Schmidt, 2013:226). Government regulations have a large impact on the reverse logistics component of a business's supply chain due to monitoring of disposal and reuse of products after its life cycle (Sheu *et al.,* 2005:288). Regulations make sustainability not just a choice but a matter of law (Diabat & Govindan, 2011:661). Government regulations stimulate the incorporation of GSCM initiatives for small, medium and large businesses (Lee & Klassen, 2008:579).

2.9.1.3 Market/Consumer

Consumers can also have a considerable impact on GSCM initiatives (Khiewnavawongsa & Schmidt, 2013:226). This is because they can determine what is required from the company. Some consumers in a high income bracket select their products based on aesthetics such as sustainability of the product, for example, biodegradable packaging (Zhu *et al.,* 2005:452). Lower income consumers may opt for a lower price instead of sustainability (Zhu *et al.*, 2005:452). As a result consumers can directly influence either a positive or negative effect on GSCM initiatives and sustainable practices within a business (Lin, Tan & Geng, 2013:102).

2.9.1.4 Competitors

Many businesses globally focus on improving their environmental performance to gain an advantage over competitors (Diabat & Govindan, 2011:661). Consumers are becoming more sensitive to environmental issues due to the degradation of the environment (Kumar & Chandrakar, 2012:3). Competitors can also have a negative effect on GSCM initiatives, this is as a result of competitors focussing on cost reduction and producing cheaper products (Dhull & Narwal, 2016:70). It is difficult

for businesses that focus on GSCM initiatives to achieve the lowest possible production cost and pressures against the adoption of GSCM initiatives are created (Dhull & Narwal, 2016:70). As a result pressures from competitors pricing can deter the adoption of GSCM initiatives.

2.9.1.5 Social

Some businesses feel that it is necessary to give back to the community and society by improving sustainability (Darnall *et al.,* 2008:34). Businesses such as Hewlett-Packard have created corporate social responsibility programmes to achieve this (Darnall *et al.,* 2008:34). Social responsibility drives GSCM initiatives, however, businesses focus on what is most important in their community (Van Rensburg, 2015:2). As a result, GSCM initiatives may not be an area of focus in different communities and as a result will hinder GSCM initiatives (Van Rensburg, 2015:11).

2.9.1.6 Inbound Logistics

According to Wu and Dunn (1995:26), inbound logistics are the activities that are related to receiving and storage within a business. Inbound logistics include initiatives such as vendor management, inventory management and green purchasing (Sellitto *et al.,* 2015:4). These factors are dependent on external factors that do not fall under the authority of the business and is focussed on the inwards movement of goods and services into the business (Kumar & Chandrakar, 2012:3). A business can incorporate various methods to influence upstream factors. Some examples are:

1. By doing audits of a suppliers environmental processes and enforcing the incorporation of ISO 14001 certification (Kumar & Chandrakar, 2012:3).
2. The coordination and incorporation of suppliers in a business's environmental initiatives such as GSCM (Kamal & Fernando, 2015:357).
3. Ensuring that the design specifications for products purchased have environmental requirements and standards (Dhull & Narwal, 2016:62).

Therefore, it can be identified that upstream activities have a substantial impact on GSCM initiatives as vendor management and purchasing are essential business processes.

2.9.1.7 Outbound Logistics

According to Huynh (2013:5), outbound logistics is the movement of the final finished product from the business to the point of its consumption. Outbound logistics include activities such as distribution and components of marketing (Kumar & Chandrakar, 2012:3). Therefore it can be said that downstream factors are related to physical distribution. Green outbound logistics is one of the most important

downstream factors that affect GSCM initiatives because of its high carbon dioxide production (Huynh, 2013:2). For example, in Southeast Asia, collaboration between suppliers and consumers on environmental issues has significantly improved the performance and adoption of green initiatives (Kumar & Chandrakar, 2012:3).

2.9.2 Internal Factors that Affect GSCM Initiatives

Internal factors are factors that operate within a business' boundaries and affect initiatives such as GSCM initiatives. Table 2.6 lists the internal factors that affect GSCM initiatives.

Table 2.6: Internal Factors that affect GSCM Initiatives

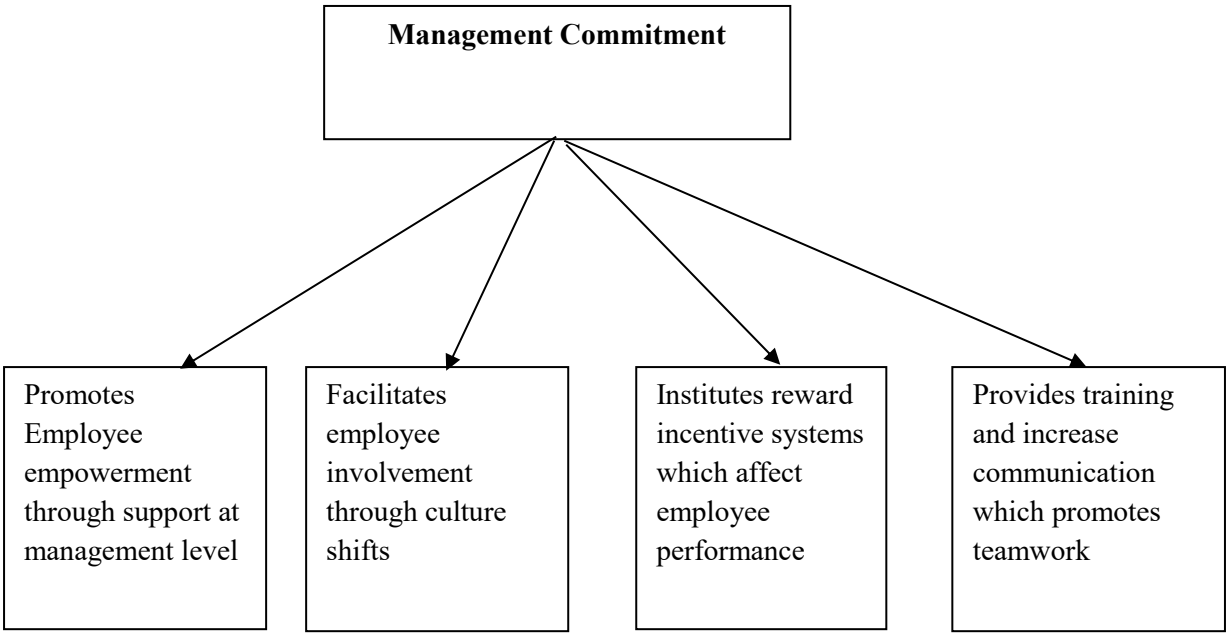
Authors	**Management Support and**	**Organisational Structure and strategy**	**Cost**	**Reverse Logistics**	**Eco-design**	**Investment Recovery**	**Organisational learning**
Diabat and Govindan (2011)		✓		✓			
Zhu, Sarkis and Geng (2005)		✓	✓				
Khiewnavawongsa and Schmidt (2013)		✓	✓				
Walker *et al.* (2008)		✓					
Liu *et al.* (2012)	✓	✓	✓				
Sari (2012)	✓	✓					
Lin (2013)		✓					
Routroy (2009)	✓	✓		✓			
Lee and Klassen(2008)	✓						
Vachon (2008)		✓		✓			
Kumar and Chandrakar (2012)	✓	✓	✓		✓	✓	✓

Source: Adapted from Kamolkittiwong and Phruksaphanrat (2011:865)

2.9.2.1 Management Support and Commitment

The support of management is a critical factor in the adoption of new initiatives and is a key factor that affects GSCM initiatives (Lee & Klassen, 2008:579). Management support can either have a positive or negative effect on GSCM initiatives (Kumar & Chandrakar, 2012:4). The support of top level management can be a strong driver of GSCM initiatives as it motivates employees and aligns business goals with sustainable initiatives from top to bottom (Dhull & Narwal, 2016:65). A lack of management support can demotivate employees and cause GSCM initiatives to fail at their initial stages of introduction (Kumar & Chandrakar, 2012:4). Figure 2.2 illustrates the importance of management commitment in the implementation of new initiatives.

Figure 2.3: The Impact of Management Commitment on New Initiatives



Source: Kumar and Chandrakar (2012:4)

From figure 2.3, it is clear that the support from top management can be related to the successful implementation of new initiatives such as GSCM practices. Consequently, the successful implementation of GSCM initiatives is reliant on management commitment (Diabat & Govindan, 2011:661). As GSCM practices affect the business as a whole, all levels of management commitment, including middle and top management, are vital (Diabat & Govindan, 2011:661). This is because it is a broad-based business endeavour and requires cross functional involvement (Kumar & Chandrakar, 2012:4). Therefore, it is clear that management commitment is a key factor affecting GSCM initiatives.

2.9.2.2 Organisational Structure and Strategy

Organisational structure and strategy can be a driver or barrier of GSCM initiatives. The ability of an organisation's strategy to achieve its goals is dependent on an organisation's capability (Lee & Klassen, 2008:187). If strategies are put in place to take a proactive stance to sustainability, they will have a greater impact on GSCM initiatives (Lee and Klassen, 2008:192). The overall organisational structure of organisations can also affect GSCM initiatives as it will determine whether GSCM initiatives are viable or not (Zhu *et al.,* 2005:462). However, it is noted by Lee and Klassen (2008:573) some businesses produce very small carbon footprints and cannot use GSCM initiatives due to the nature of their business.

2.9.2.3 Cost

A common factor that affects GSCM initiatives are the cost implications it has on the business (Lee, 2008:191). GSCM initiatives can increase or decrease a business' cost structure (Diabat & Govindan, 2011:665). Many businesses are concerned about the financial implications of GSCM initiatives as it reduces their bottom line. According to Khiewnavawongsa and Schmidt (2013:3) financial implications are one of the main deterrents of GSCM initiatives. This is a result of the increase of three core aspects, namely: product cost price; raw material cost price; and investment cost (Khiewnavawongsa & Schmidt, 2013:3). Environmentally friendly goods and packaging often cost more than normal materials (Zhu *et al.,* 2005:457). It also increases operations cost and the investment cost through changes in operations, training costs and redesigning of processes (Zhu *et al.,* 2005:459). However, businesses can also reduce costs through reducing waste fees, government regulations costs and reduced energy consumption (Zhu *et al.,* 2005:459).

2.9.2.4 Reverse Logistics

Reverse logistics play a crucial role in GSCM as it is seen as the closing of the "loop" and the end of a products lifecycle (Zhu, Sarkis & Lai, 2008:4). Reverse logistics focuses on the disposal and recovery of raw materials, work-in-process, final products and information (Jumadi & Zailani, 2010:262). Reverse logistics is essential for processes such as recycling, refurbishing, re-use and remanufacturing (Choudhary & Seth, 2011:4986). Logistics is also seen as a high cost operation that many businesses chose to outsource or minimise (Jumadi & Zailani, 2010:266). This can have a negative effect on GSCM initiatives as it reduces the possible GSCM techniques especially in the pharmaceutical industry (Narayana *et al.,* 2014:381). This is because in the pharmaceutical industry one of the main

environmental hazards is the waste from production and consumption, in which reverse logistics plays a crucial role by eliminating waste (Narayana *et al.,* 2014:381).

2.9.2.5 Eco-design

Eco-design initially focussed on improving a business's products and processes to reduce environmental costs (Green *et al.,* 2012:293). Eco-design has evolved substantially and in some instances involves factors outside of a business's direct control such as relationships with suppliers, recyclers and consumers (Green *et al.,* 2012:290). Eco-design can only be successful if there is good internal cross-functional cooperation between business units and external partners that form the supply chain (Kumar & Chandrakar, 2012:3). To further emphasise the link between GSCM and eco-design the Environmental Protection Agency in the U.S as well as Chinese organizations use eco-design as a core aspect of their environmental sustainability initiatives (Zhu, Sarkis & Geng, 2005:453; Kumar & Chandrakar, 2012:3).

2.9.2.6 Investment Recovery

Investment recovery in a sustainability context refers to a business' strategic use recycling, reverse logistics, redeployment as well as similar techniques to gain greater value from its inputs such as materials and assets (Kumar & Chandrakar, 2012:3). The aim of investment recovery is to convert excess assets into revenue for the business (Zhu *et al.,* 2005:453). Equipment that is out-of-order, waste and by-products as well as excess materials are identified as stagnant assets (Zsidisin & Siferd, 2001:62). Investment recovery can be achieved through the sale of stagnant assets, redeploying unused assets to other corporate locations to reduce the need to purchase materials and equipment and making better use of storage space (Kumar & Chandrakar, 2012:3). Investment recovery is also an essential component of reverse logistics which has been identified as a key aspect of GSCM (Narayana *et al.,* 2014:380). Recycling, reuse and remanufacturing which are components of reverse logistics are all factors of investment recovery (Green *et al.,* 2012:293).

2.9.2.7 Organisational Learning

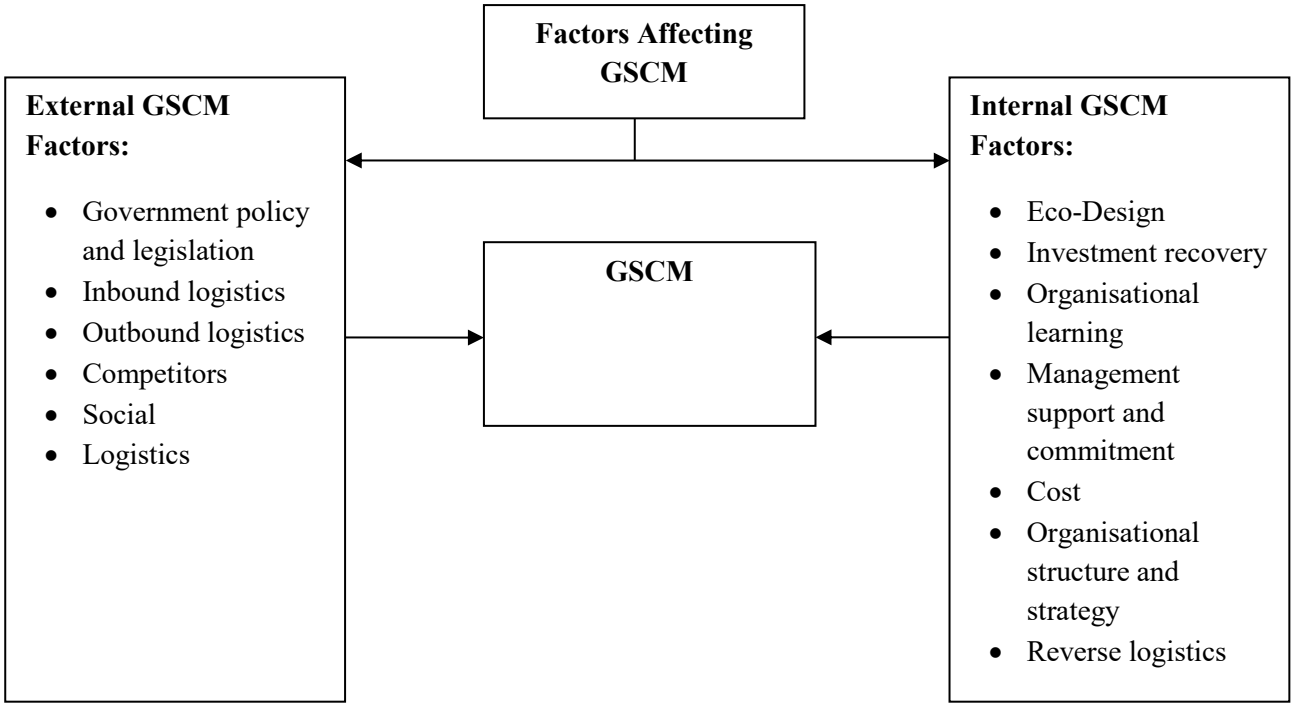
Organisational learning can be seen as the developed capabilities and intelligence that a business and its employees develop over time (Wood & Reynolds, 2013:150). The implementation of a business' strategies including sustainable initiatives, are dependent on effective deployment, development and maintenance of capabilities and resources over time (Wood & Reynolds, 2013:151). Organisational learning is important for continuous improvement of initiatives and thus better use of business resources in the future (Dalkir, 2005:26). As a result organisational learning can be used as a tool to facilitate

initiatives such as Environmental Systems Management, ISO 14001 and GSCM practices. Organisational learning assists businesses to develop new routines and processes through the improvement of old processes and helps businesses identify inefficiencies and develop better methods to operate (Kumar & Chandrakar, 2012:3). GSCM initiatives benefit directly from organisational learning as they are people-intensive by nature and thus are dependent on tacit skill development. Skill development is developed through shared expertise gained through team efforts (Kumar & Chandrakar, 2012:3). This means GSCM initiatives are reliant on cross-functional efforts and the pooling of expertise.

2.10 KEY FACTORS THAT AFFECT GSCM INITIATIVES

The factors that affect GSCM initiatives discussed in section 2.7 form the foundation that guided this study and was used to identify the key factors that affect GSCM initiatives at Cipla Medpro manufacturing. By grouping the factors (Figure 2.4) affecting GSCM into pre-identified groups it is easier to organise the data gathered from the study into meaningful information.

Figure 2.4: Factors Affecting GSCM



Source: Adapted from Kumar and Chandrakar (2012:3-4)

Cipla Medpro Manufacturing is part of Cipla Medpro Global. The factors identified in figure 2.4 are applicable to Cipla Medpro Manufacturing as they have been identified by Kumar and Chandrakar (2012:3-4) as factors affecting GSCM initiatives the pharmaceutical industry.

2.11 RECOMMENDATIONS ON HOW FACTORS THAT NEGATIVELY IMPACT ON GSCM CAN BE OVERCOME BY VARIOUS AUTHORS

There are various recommendations by authors as to how to overcome negative factors that affect GSCM initiatives. The researcher has selected the most relevant recommendations.

2.11.1 Reduce Cost Implications through Better Design

According to Zsidisin and Siferd (2001:67), one way to remove barriers that affect GSCM initiatives such as high cost implications from reverse logistics and disposal is through better initial design of products and services. Zsidisin and Siferd (2001:67) highlight seven key aspects of a good green product design:

1. Design for ease of assembly
2. Design for ease of disposal and to ensure that there is no negative effect on the environment
3. Design to remove harmful processes within the manufacturing operations
4. Design for ease of returns and distribution
5. Design without the use of any hazardous materials
6. Design for meeting the customers' requirements
7. Design to ensure reliability and durability

Zsidisin and Siferd (2001:67)

2.11.2 Improve Return on Investment through use of Environmental Technologies

Vachon and Klassen (2006:662) believe that the use of environmental technologies is essential in combating factors such as high cost implications and improving return on investment. These green technologies are machinery that operate similar to normal machinery while reducing emissions. This is common in industry such as the package printing industry. The use of these machines will reduce carbon emissions and help avoid government fines and other costly carbon reduction techniques (Vachon & Klassen, 2006:662).

2.11.3 Promotion of a Business' Green Activities to Improve Return on Investment and Gain Customer Loyalty

The promotion of a business's green initiatives to the public can improve a business's return on investment. Research conducted by Griskevicius *et al.* (2010) found that the current generation of

consumers prefer green products to normal products. The study also stated that this would positively impact on consumers buying preferences and loyalty if consumers where aware of the products or businesses sustainable status (Griskevicius *et al.,* 2010:396-397).

2.11.4 Improving a Business's Support and Commitment to GSCM Initiatives through the use of Champions

The use of dedicated champions is crucial in improving a business' support and commitment. The lack of support and commitment is one of the main causes of the failure of a business's GSCM initiatives at the initial stages. Champions empower employees to work towards improving green initiatives and ensure that management remains focused on improving sustainability. Champions can be pivotal in an organisational cultural shift but also play a role in educating on the purpose of GSCM initiatives and the benefits that it produces for the business (Kumar & Chandrakar, 2012:3).

2.12 QUESTIONS FOR THE PRIMARY STUDY

From the theory reviewed in this chapter, the following questions were identified that are included in the interview guide to be used during the primary data collection of this study. Table 2.6 depicts the open-ended questions included in the interview guide which was used during the interviews of this study.

Table 2.7: Questions included in the Interview Guide

Questions	Referring sections
How does green supply chain management function within the planning, procurement and logistics departments at Cipla Medpro?	Section 2.6
What are the factors that affect GSCM initiatives at Cipla Medpro Manufacturing?	Section 2.9
What are some of the implications of GSCM at Cipla Medpro Manufacturing?	Section 2.5 and 2.7
What is the most critical factor affecting GSCM initiative at Cipla Medpro Manufacturing?	Section 2.10
What remedies does Cipla Medpro Manufacturing have in place to overcome the factors that negatively affect GSCM initiatives?	Section 2.11
What is the value add of green supply chain management at Cipla Medpro?	Section 2.7 and 2.8

Source: Compiled by researcher (2016)

2.13 CONCLUSION

This chapter provided a theoretical discussion of SCM and the evolution of GSCM in order to create the foundation for the study. GSCM is defined and explained by identifying the elements of GSCM and contributing factors of this environmental management technique. Contributing factors and key terminology are also defined to create an understanding of linked concepts and closely related topics. The value add implications and possible negative impacts of GSCM initiatives are also discussed. This chapter also uses literature from various sources to identify the factors that affect GSCM and possible recommendations to remedy these problems. The next chapter deals with literature on the pharmaceutical industry and pharmaceutical supply chains.

CHAPTER 3

THE PHARMACEUTICAL INDUSTRY

3.1 INTRODUCTION

This chapter is the final chapter of the literature review of this study. In order to identify the factors that affect GSCM initiatives within a pharmaceutical company, it is important to provide the context of the pharmaceutical industry. This chapter provides an overview of the pharmaceutical industry in South Africa. The pharmaceutical industry is a high risk and a high profit generating industry (Angell, 2004:1451). In South Africa it is especially popular due to prevalent pandemics such as HIV/AIDS and diabetes (Cipla, 2016: Internet). As a result the supply chains of pharmaceutical companies are complex and affected by many factors (Faisal, 2015:2). As this study focuses on factors that negatively affect GSCM initiatives in the pharmaceutical industry, the chapter provides insight into these factors.

Against this background, this chapter commences by providing an overview of the pharmaceutical industry globally and in South Africa, followed by a discussion of the pharmaceutical supply chains. Secondly, it discusses some key factors facing pharmaceutical supply chains and GSCM practices in the pharmaceutical supply chain. In the final section of this chapter a list of questions based on the literature study for use in the primary research is presented. The chapter then concludes with a conclusion.

3.2 OVERVIEW OF THE PHARMACEUTICAL INDUSTRY GLOBALLY

The pharmaceutical industry can be defined as the complex flow of operations involved with the manufacturing and distribution of drugs and medicines (Shah, 2004:929). According to Xie and Breen (2012:4), 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 (Narayana *et al.,* 2014:381). According to Angell (2004:1451), 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 (Angell, 2004:1451). The reason behind the pharmaceutical industry being high risk is as a result of the factors that influence it (Xie & Breen, 2012:4).

3.2.1 Gross Domestic Product (GDP) and Employment Produced by the Pharmaceutical Industry

The pharmaceutical industry is one of the highest profit generating industries globally (Angell, 2004:1451). Khanna (2012:1088) stated that, in 2010, the pharmaceutical industry generated a total of 865 billion dollars globally. By 2015, GDP was estimated to have grown to 1,114 billion dollars (Dezzani, 2016:Internet). The top ten global pharmaceutical companies generate a large portion of the industries revenues. Table 3.1 lists the top ten pharmaceutical companies globally based on GDP and their forecasted growth rate.

Table 3.1: GDP and Annual Growth Rate of the Top 10 Pharmaceutical Companies in 2015

Top 10 pharmaceutical Companies of 2015	Total Revenue in millions	Growth rate from 2014 to 2015 (%)
Johnson & Johnson	70,074	-5.73
Hoffmann-La Roche AG	50,111	-3.50
Bayer AG	51,407	-6.44
Novartis AG	49,414	-5.30
Pfizer Inc.	48,851	-1.52
Merck & Co., Inc. (U.S.)	39,498	-6.48
GlaxoSmithKline plc (U.K.)	36,566	-3.54
Sanofi (France)	34,542	8.99
Gilead Sciences, Inc. (U.S.)	32,639	31.13
AstraZeneca plc (U.K.)	23,641	-9.40

Source: Dezzani (2016: Internet)

The pharmaceutical industry is also a key contributor to the employment sector globally. This is through direct employment, indirect employment such as outsourcing of activities like distribution and induced employment through the employment created by suppliers and third party businesses (International Federation of Pharmaceutical Manufacturers & Associations, 2015:41). Table 3.2 identifies the total number of people employed in the pharmaceutical industry globally between 2006 and 2012.

Table 3.2: Employment in the Pharmaceutical Industry Globally from 2006 to 2012

Year	Employment rate
2006	3 640 000
2007	3 680 000
2008	3 829 000
2009	3 919 000
2010	4 070 000
2011	4 237 000
2012	4 443 000

Source: International Federation of Pharmaceutical Manufacturers & Associations (2015:46)

From table 3.2, the steady growth in employment in the pharmaceutical industry is clear. Between the years 2006 and 2012 the amount of people working in the pharmaceutical industry increased by 794,000

(International Federation of Pharmaceutical Manufacturers & Associations, 2015:45). The increase in the employment rate within the pharmaceutical industry is due to the increasing number of aging populations, lifestyle diseases and technological advancements, which increase the need for medications and drugs (Deloitte, 2015:3). Table 3.1 indicates that the pharmaceutical industry is a large contributor to employment and continues to grow.

3.3 GLOBAL CHALLENGES AND THE ENVIRONMENT

There are many challenges that affect the environment. It is important to take these challenges into consideration as they affect the global economic environment. Some of the most important issues are identified below:

1. **Climate change:** According to Stern (2006:1), climate change or global warming has come about because of human activity. The continuous destruction of the earth's natural environment to facilitate for human housing, farmlands and urban areas has damaged the earth's ability to maintain its previous climate and thus making way for climate change (Foley, DeFries, Asner, Barford, Bonan, Carpenter, Chapin, Coe, Daily, Gibbs & Helkowski, 2005:570). Climate change has dire consequences for businesses and communities alike, such as, rising sea levels, storms, droughts and floods (Stern, 2006:1). Climate change is a growing threat to the human race as a whole (Gray, 2006:1).
2. **Food and Water Shortages:** As the population grows the requirement for basic needs such as food and water increases (Godfray *et al.,* 2010:1). These basic resources are required for all economic and societal activities (Hanasaki, Fujimori, Yamamoto, Yoshikawa, Masaki, Hijioka, Kainuma, Kanamori, Masui, Takahashi & Kanae, 2013). The earth has reached a population of 9 billion people and this has had a strong impact on the food and water supply, especially fisheries which are currently experiencing over exploitation (Godfray *et al.,* 2010:1). One of the reasons for food and water shortages is the use of land that is needed to maintain the growing human population (Foley *et al.,* 2005:570). Deforestation and destruction of natural environments has caused the diminishing of natural occurring resources (Mellino & Ulgiati, 2015:309). According to Harvey (2014), within two generations the world will experience pressures with the supply of sufficient fresh water. This will be attributed to the exploitation of resources, pollution and climate change (Harvey, 2014).
3. **Over population:** Over population has become an area of growing concern as the global population reaches 9 billion people (Godfray *et al.,* 2010:1). According to Kopnina and Washington (2016:1), population growth can be identified as a key factor in the destruction of the environment and sustainability. Competition for land, energy, water and other resources is beginning to affect the environment and the sustainability of earth's environment (Godfray *et al.,* 2010:1). The growing need for housing and land for use by humans has destroyed many

ecosystems and permanently damaged ecosystems (Foley *et al.,* 2005:570). As a result humans destroy the balance of the ecosystem by destroying biodiversity and increasing the consumption of earth's natural resources (Kopnina and Washington, 2016:1).

4. **Land Use**: The continuous growth of the human race means that the need for land use for housing, leisure and other requirements has increased (Mellino & Ulgiati, 2015:309). This has caused severe losses in biodiversity, which are the ecosystems that have previously occupied different areas (Foley *et al.,* 2005:570). These ecosystems play a key role in sustaining food production for the environment, maintain fresh water, and regulate climates, maintaining air quality and forest resources (Foley *et al*., 2005:570). Ecosystems generally consist of a few abundant and many rare species, this can be identified as the shape of species abundance distributions (Simons, Gossner, Lewinsohn, Lange, Türke & Weisser, 2015:143). Land use has thrown this balance off in many ecosystems which resulted in the destruction of that ecosystem (Simons *et al.,* 2015:143). A study by Simons *et al.* (2015:143) in regions in Germany has shown that land use has affected the shape of species abundance distributions whereby the abundant species thrived and the rare species have died out. Without this biodiversity the ecosystem will slowly decay (Simons *et al.,* 2015:143).

3.4 PHARMACEUTICAL INDUSTRY IN SOUTH AFRICA

The pharmaceutical industry in South Africa contributed 1.58% of South Africa's total GDP in the 2008/2009 financial year; this was a total revenue of 36, 1 billion rand (Health24.com, 2013:Internet). South Africa's health care industry is divided into the private and public sector. 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 (Utipharma, 2015:4). South Africans spend approximately 1.9% of their household expenditure on pharmaceutical and medical products (Health24, 2013). Pharmaceutical companies in South Africa cater for the needs of both the public and private sector. Table 3.3 identifies the top 10 pharmaceutical companies in South Africa based on market value and their market positions between 2011 and 2015.

Table 3.3: Top 10 Pharmaceutical Companies in South Africa

Corporation	Position 2011	Position 2011	Market Value 2015 (billion)
ASPEN	1	1	5.102
ADCOCK INGRAM	2	2	2.943
SANOFI	3	3	2.213
NOVARTIS	5	4	1.908
PFIZER	4	5	1.844
CIPLA	6	6	1.629
JOHNSON & JOHNSON	8	7	1.294
MERCK & CO	9	8	1.223
BAYER	10	9	1.184
ROCHE	11	10	1.066

Source: Utipharma (2015:9)

The pharmaceutical industry in South Africa is growing steadily due to pandemics such as HIV/AIDS (Rosenkranz, Reid & Allen, 2016:33). According to (Orrell, Bangsberg, Badri & Wood, 2003:1369) approximately one in five South Africans have HIV/AIDS and require antiretroviral (ARVs) therapy. Since 1994 there has been growing conflict between the South African government and pharmaceutical companies in the United States of America. This conflict has arisen because the South African government had implemented legislation to lower the costs of medicines and drugs; this has had a strain on the pharmaceutical industry in South Africa (Bond, 1999:765).

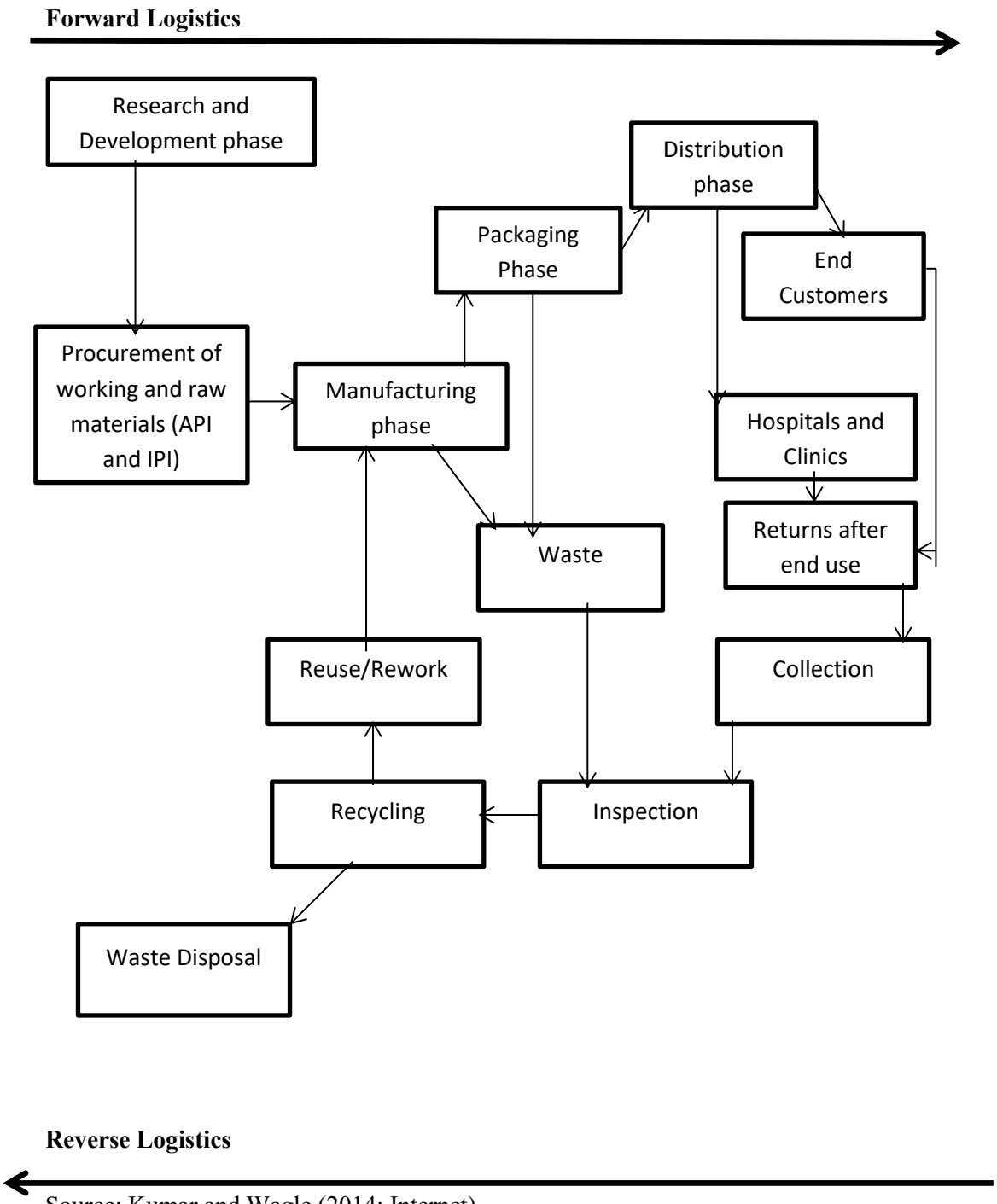
The South African government initially subsidised drugs such as ARVs in an attempt to provide the quality health care treatment to the growing number of individuals that are affected by HIV/AIDS (Schneider, 2002:153). However, this proved to be too costly and the South African government turned to low cost generic drugs to assist people suffering with HIV and AIDS (Dukes, 2002:1684). This emphasises the importance of pharmaceutical companies in South Africa.

3.5 PHARMACEUTICAL SUPPLY CHAINS

Supply chains operate in all businesses and encompass operations such as the procurement, storage and movement of goods and services, to name a few (Zigiaris, 2000:3). A pharmaceutical supply chain is an unusual supply chain, because its unique and more complex than supply chains in other industries (Shah, 2004:929).This uniqueness and complexity is created by constantly changing operational and competitive environment in which the pharmaceutical industry operates (Rossetti, Handfield & Dooley, 2011:602). Pharmaceutical supply chains face factors such as high R&D investment, long manufacturing times, tough quality constraints and high waste generation which also influences the reverse logistics cost (Narayana *et al.,* 2014:381). As a result pharmaceutical supply chains are more

difficult, making initiatives such as GSCM more costly and time consuming. Figure 3.1 illustrates a basic pharmaceutical supply chain – each phase is explained in more detail.

Figure 3.1: Basic Pharmaceutical Supply Chain



Source: Kumar and Wagle (2014: Internet)

1. **Research and development** are the initial stages of products in the pharmaceutical industry and pharmaceutical supply chains (Deloitte, 2015:9). This stage is highly expensive and takes many years (International Federation of Pharmaceutical Manufacturers & Associations, 2015:9). The cost of developing a single drug amounts to over 1.5 billion dollars (International Federation of Pharmaceutical Manufacturers & Associations, 2015:9). This stage has a high failure rate as well and is therefore one of the most important stages in a pharmaceutical supply chain (International Federation of Pharmaceutical Manufacturers & Associations, 2015:9).
2. **Materials are procured** to make the product. These include production goods, raw materials and packaging materials. Raw materials are divided into two groups namely Inactive Pharmaceutical Ingredients (IPIs) and Active Pharmaceutical Ingredients (APIs). Active Pharmaceutical Ingredients are the substances that are used in the manufacturing of a dosage form drug product and are also known as the key ingredient (Gray, 2006). Inactive Ingredients are used to maintain dosage drugs storage, safety and efficacy (Steinberg, Blecher & Mercill, 2001:62).
3. During the **manufacturing and packaging phases** waste and by products are created. These wastes are either recycled for reuse or disposed of. Certain materials must be disposed of in a sludge plant as they will have a negative effect on the environment (Jones, Voulvoulis & Lester, 2001:1383).
4. At the **distribution phase** the finished products are shipped to pharmacies, clinics, hospitals and other consumers. Some pharmaceutical waste such as left over medication and damaged/compromised products are returned to the company (Xie & Breen, 2012:8).
5. The **end users** consume the product and discard the waste. Defective and expired products are returned to the company for disposal or recycling (Kumar and Wagle, 2014).
6. The company will then inspect and separate the goods to either be disposed of or recycled. Pharmaceutical products can have a negative impact on the environment if they are not disposed of correctly. Pharmaceutical products such as antibiotics, analgesics and lipid regulators have been found in water sources and have had a negative effect on the environment (Jones, Voulvoulis & Lester, 2001:1383).

3.6 GSCM INITIATIVES IN THE GLOBAL PHARMACEUTICAL INDUSTRY

The pharmaceutical industry and other industries have similar GSCM initiatives (Attar, Gilaninia & Homayounfar, 2016:48). Some of the most common GSCM initiatives are (1) green purchasing, (2) green production, (3) reverse logistics, (4) green transportation and distribution and (5) green packaging (Attar *et al.,* 2016:48). These initiatives are explained below:

1. **Green Procurement** - Green procurement can be defined as purchasing practices that include environmental considerations (Lacroix, 2008:2). According to Appolloni, Sun, Jia and Li (2014:3), green procurement is the set of purchasing policies, relationships and actions taken in response to environmental concerns. One of the most common types of green procurement is the buying of eco-labelled and environmentally friendly products and materials, these products have a lower impact on the environment than standard products (Lacroix, 2008:2). Green procurement affects two key aspects in a pharmaceutical company, namely, (1) corporate social responsibility, and (2) the carbon footprint of pharmaceutical products (Welter, 2012).

    - Corporate Social Responsibility (CSR) - Is a business's social responsibility to give back to the community, environment, maintain human rights and the proper treatment of its employees (Servaes & Tamayo, 2013:1046). A CSR programme entails the business giving some of its resources to reduce some social or environmental impact (Isaksson, Kiessling & Harvey, 2014:67). It is seen as non-profit generating but has benefits such as improving the company's public image (Isaksson *et al.,* 2014:67).

    - Carbon footprint of the product - A products carbon footprint is the amount of carbon emissions that are produced throughout a products lifecycle (Trappey, Trappey, Hsiao, Ou & Chang, 2012:935). The carbon foot concept came about to measure the impact that a product, service or organisation has on climate change (Scipioni, Manzardo, Mazzi & Mastrobuono, 2012:94).

    The World Health Organisation has well established green procurement procedures for the pharmaceutical and health care industry that are also transparent (Welter, 2012). The World Health Organisation came into force in 1948 in order to improve health care internationally and is internationally recognised (World Health Organisation, 2016). As a result the procedure set by them for green procurement is commonly used by pharmaceutical companies (Welter, 2012).

2. **Green Production** - Green production can be defined as the production of goods by taking environmental sustainability into consideration and minimisation of the impact that production has on the environment (Sheldon, 2014:950). Within the pharmaceutical industry there are two commonly used methods that are used to ensure green production, namely, (1) the use of green technology, and (2) green chemistry (Sheldon, 2014:950 and Boltic, Ruzic, Jovanovic, Savic, Jovanovic, & Petrovic, 2013:123).

    - Green technology - Basically is the use of technology to reduce the pollution created through production (Boltic *et al*., 2013:123). The technology is aimed at improving the efficiency of production whilst using fewer resources, reducing greenhouse gas emissions and minimising the degradation of the environment (Ng, Yew, Basiron & Sundram, 2012:1).

- Green Chemistry - Is the efficient utilisation of raw materials - preferably renewable, elimination of waste and the avoidance of the usage of hazardous solvents and reagents in the manufacturing of chemical products (Sheldon, 2014:950).

3. **Reverse Logistics** - Is the backward movement of waste and products back into the company for reuse or disposal (Ivona, Novačko & Ogrizović, 2014:10). Reverse logistics is the aspect of logistics that deals with product returns, recycling, waste disposal, reuse of materials, remanufacturing and repair (Wright, Richey, Tokman & Palmer, 2011:10). Pharmaceuticals generally consist of high value chemicals, that require proper reverse logistics management, especially of expired and recalled stock (Narayana *et al.,* 2014:381). 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 (Jones, Voulvoulis & Lester, 2001:1383). The pharmaceutical industry has a high waste to product ratio and therefore requires efficient reverse logistics systems (Narayana *et al.,* 2014:381). Reverse logistics can be used to minimise or mitigate the damage done to the environment by waste and expired pharmaceutical products (Narayana *et al.,* 2014:381).

4. **Green transport and distribution** - Is the use of environmentally friendly transportation or using methods of transportation that has a reduced impact on the environment than standard transport methods (Ubeda, Arcelus & Faulin, 2011:44). The over utilisation of road freight causes high levels of pollution through air and noise (Demir, Bektaş & Laporte, 2014:2). The movement towards environmentally friendly fuels and other more efficient methods of transport can be identified as green transport and distribution initiatives (Demir *et al.,* 2014:2). Green transportation and distribution reduces an organisations and products overall carbon footprint, this improves environmental performance (Zhang, Methipara & Lu, 2011:1-2).

5. **Green Packaging** - Packaging in the pharmaceutical industry is critical as pharmaceutical products are highly sensitive and can be compromised by environmental factors such as heat and micro-organisms (Kümmerer, 2010:90). According to Zsidisin and Siferd (2001:66), green packaging is important in any green strategy as packaging is one of the main causes of land pollution. Environmentally friendly packaging can be used in pharmaceutical products with added benefits such as improving product life span. Kümmerer (2010:81&92) identifies methods that can be used to implement green packaging initiatives:
    - Resource reduction strategies - This technique entails using less packaging per each product and thereby reducing the amount of resources used and pollution caused by their disposal.

- Recycling - This method of recycling packaging that has been used and disposed of as well as waste generated during production. This waste can be recycled and reused for packaging thus reducing pollution and resource wastage.

Zsidisin and Siferd, 2001:66-67

3.7 KEY FACTORS FACING GSCM INITIATIVES IN PHARMACEUTICAL SUPPLY CHAINS

There are many key issues that affect GSCM initiatives within all industries including pharmaceutical industries. Some of these factors go across industries. These issues can also directly impact on the implementation of initiatives such as GSCM (Faisal, 2015:2). Dhull and Narwal (2016:64) identify factors that affect multiple industries including the pharmaceutical industry. Dhull and Narwal (2016:71) have done in-depth research consisting of over 25 forms of literature from various authors that is reasoning behind the use of their research in this study. Table 3.4 identifies some of the core factors affecting pharmaceutical industries. The factors have been given numbers so that they can be easily identified.

Table 3.4: Factors Affecting GSCM Initiatives from Multiple Industries Including the Pharmaceutical Industry

	No.	Negative Factor	Description
Internal Factors of GSCM initiatives	**1**	High cost	Investment costs are high in the implementation of green practices such as eco-design and green manufacturing
	2	Lack of understanding to incorporate green buying	The organisation cannot implement green buying due to lack of understanding
	3	Inappropriate organisational structure	Organisations are unable to adopt GSCM due to their organisational structure
	4	Cost reduction at the cost of the environment	Industry has pressure of lowering prices at the cost of the environment
	5	Lack of Management commitment	Lack of management commitment is a key barrier affecting GSCM implementation
	6	Lack of adaption of advancement in technology/Manufacturers reluctance to change	Small and medium sized companies are reluctant to get advanced technology
	7	Lack of training	Lack of training of staff in GSCM is a major factor affecting GSCM
	8	Too complex to implement	GSCM practices are complex and difficult to implement
	9	Low return on investment	Low or no return on investment for the companies in some instances

External Factors of GSCM initiatives	**10**	Cost of eco-friendly packaging	The cost of adopting green packaging materials are high
	11	Lack of technological infrastructure	Lack of technological infrastructure makes GSCM hard to implement
	12	Inhibits innovation	GSCM inhibits innovation that negatively affects the environment
	13	Lack of skilled human resources in the implementation of GSCM	GSCM cannot be successfully implemented until the industry has the skilled human resources for it
	14	Poor supplier commitment	Suppliers do not commit to supplying environmentally friendly goods/services
	15	Not willing to change trade information	Industries are reluctant to share trade information with each other
	16	Lack of government support	Government regulations can discourage the adoption of initiatives, as they set the regulations for the industry
	17	Lack of information technology	Lack of information technology make it difficult to achieve efficient GSCM
	18	Lack of ethical standards and corporate social responsibility	Many businesses do not have high ethical values and accountability
	19	Pressure of lower prices	The demand for cheaper products in the market at the cost to the environment
	20	Lack of demand and public awareness	Lack of awareness by customers about the benefits of green products
	21	Competition and uncertainty	Competition and uncertainty in the market is very high due to international competitiveness and changing customer requirements
	22	Pressure of lower price	It is difficult for suppliers to keep low prices and implement GSCM initiatives
Society	**23**	Lack of awareness in the society	Unawareness in society means that customers are still unaware of green products
	24	Poor supplier commitment	Suppliers do not give assurance to adopt GSCM practices which means that they may not involve themselves in initiatives such as green design, packaging and manufacturing
	25	Lack of knowledge and experience among suppliers	Industries are deficient in information and skills and therefore reduces the likeness that they will implement GSCM
	26	Lack of understanding among supply chain stakeholders	Lack of understanding of GSCM and its purpose among suppliers

Source: Dhull and Narwal (2016:70)

Table 3.4 identifies some of the factors that affect pharmaceutical companies but does not highlight all. Factors affecting GSCM initiatives at pharmaceutical companies change depending on many variables

such as geographic location, the current and forecasted economy and many other variables (Rossetti *et al.,* 2011:602-605). Table 3.5 identifies which authors have identified each factor provided in table 3.4. This compilation of various authors was constructed by Dhull and Narwal (2016:71) to validate table 3.4 above in their own study.

Table 3.5: Literature by Various Authors that Identify Factors that Affect GSCM across Industries Including the Pharmaceutical Industry

Author/Year	Factor identified by author (Numbers coincide with those given by table 3.4)
Dashore and Sohani (2013)	1, 3, 4, 5,6 ,8 ,9, 10, 13, 16, 17, 18, 20, 21, 24, 25, 26
Balasubramanian (2012)	1, 4, 5, 6, 7, 8, 11, 13, 16, 17, 18, 20, 21, 24, 25, 26
Singh *et al*. (2012)	4, 11, 16, 20
XianbingLui *et al*. (2012)	17
Bhateja *et al*. (2011)	1, 7
CumkuanBao (2011)	3
Koho *et al*. (2011)	4, 20
Luthra *et al*. (2011)	1, 4, 5, 13, 16, 20, 24
Quesada *et al*. (2011)	3
Lettice *et al*. (2010)	24
Holt and Ghobadian (2009)	3
Zhang *et al*. (2011)	1, 11, 16
Hsu and Hu (2008)	5, 14
Shi *et al*. (2008)	1, 4, 5, 20, 21
Singh and Kant (2008)	3, 4, 11, 12
Walker *et al*. (2008)	1, 2, 3, 6, 12, 14, 15, 19, 20
Wang *et al*. (2008)	1, 3, 5
Yu and Hui (2008)	6, 25, 26
Yu *et al*. (2008)	1, 4, 20
Zhu *et al*. (2008)	20
Chien *et al*. (2007)	13
Hosseini (2007)	1, 16, 21, 24
Srivastva (2007)	16
Yu Lin (2007)	13
Zhu *et al*. (2007)	20
Orsato (2006)	22
Zhu and Sarkis (2006)	10
Min and Galle (2001)	3, 4, 5

Source: Dhull and Narwal (2016:71)

3.8 GSCM IN THE PHARMACEUTICAL INDUSTRY

As alluded to earlier, a Pharmaceutical Supply Chain is the term that is used to identify supply chains that operate within pharmaceutical companies. The reason for this is because pharmaceuticals are different from other commodities and must be treated unlike other commodities (Xie & Breen, 2012:2).

The pharmaceutical industry consists of stringent processes, research and development, operations management and the manufacturing of drugs and various medications (Narayana *et al.,* 2014:381). The pharmaceutical industry can be characterised by high research and development costs, quality constraints, high waste to product ratios and lengthy production times (Narayana *et al.,* 2014:381). Pharmaceutical companies therefore follow strict guidelines and regulations when conducting business operations (Faisal, 2015:2). This legislation set by the government and international bodies must be followed for companies to operate legally (Faisal, 2015:2).

Green initiatives within the pharmaceutical industry have been an area of focus for academics globally, this is evident from the number of articles published since 2005. Table 3.6 is a list of studies carried out on GSCM within pharmaceutical industries.

Table 3.6: List of Studies and Literature on GSCM and Green initiatives within the Pharmaceutical Industry

Author/s (Year published)	**Topic Title**	**Aim of Research**
Sheldon (2005)	Green solvents for sustainable organic synthesis: state of the art	To develop solvents that are environmentally friendly and reduce production and reverse logistics costs.
Federsel (2006)	In search of sustainability: process R&D in light of current pharmaceutical industry challenges	To incorporate sustainability into products from the research and development stage.
Khetan and Collins (2007)	Human pharmaceuticals in the aquatic environment: a challenge to green chemistry	To identify and state the effects of pharmaceuticals on aquatic environment.
Alfonsi, Colberg, Dunn, Fevig, Jennings, Johnson, Kleine, Knight, Nagy, Perry and Stefaniak (2008)	Green chemistry tools to influence a medicinal chemistry and research chemistry based organisation	To develop a tool for the use of more environmentally friendly solvents.
Kümmerer (2009)	The presence of pharmaceuticals in the environment due to human use –present knowledge and future challenges	To determine the effect of pharmaceuticals in the environment due to human usage and waste.
Kümmerer (2010)	Why Green and Sustainable Pharmacy?	To identify the importance of green initiatives in the pharmaceutical industry.
Jiménez-González, Poechlauer, Broxterman, Yang, Ende, Baird, Bertsch, Hannah, Dell'Orco, Noorman and Yee (2011)	Key green engineering research areas for sustainable manufacturing: A perspective from pharmaceutical and fine chemicals manufacturers	To identify key areas for incorporating sustainable manufacturing within the pharmaceutical industry.

Xie and Breen (2012)	Greening community pharmaceutical supply chain in UK: a cross boundary approach	To design a green pharmaceutical chain that reduces and disposes of pharmaceutical waste.
Narayana *et al.,* (2014)	Reverse Logistics in the pharmaceutical industry: a systematic analysis	To present a systematic analysis of the complex interaction of the factors affecting reverse logistics processes in a pharmaceutical chain.
Faisal (2015)	Research Analysis on Barriers to Greening Supply Chain Management in Pharmaceutical Industries	To describe the behaviour related to the barriers that green supply chain management faces in the pharmaceutical industry.
Angela (2013)	Green Management Practices and Supply Chain Performance of Pharmaceutical Companies in Nairobi, Kenya	To determine the relationship between green supply chain management practices and supply chain performance of pharmaceutical companies in Kenya.
Bag (2013)	Designing the Green Supply Chain Strategy for Indian Manufacturing	To develop a system to develop GSCM strategies.

Source: Compiled by researcher (2016)

Table 3.6 identifies that green initiatives and sustainability has become an area of focus within the pharmaceutical industry. This has allowed researchers and academics to gain a greater insight into green initiatives within the pharmaceutical industry.

3.9 QUESTIONS FOR THE PRIMARY STUDY

From the theory reviewed in this chapter, the following questions were identified that are included in the interview guide to be used during the primary data collection of this study. Table 3.7 depicts the open-ended questions included in the interview guide which was used during the interviews of this study.

Table 3.7: Questions Included in the Interview Guide

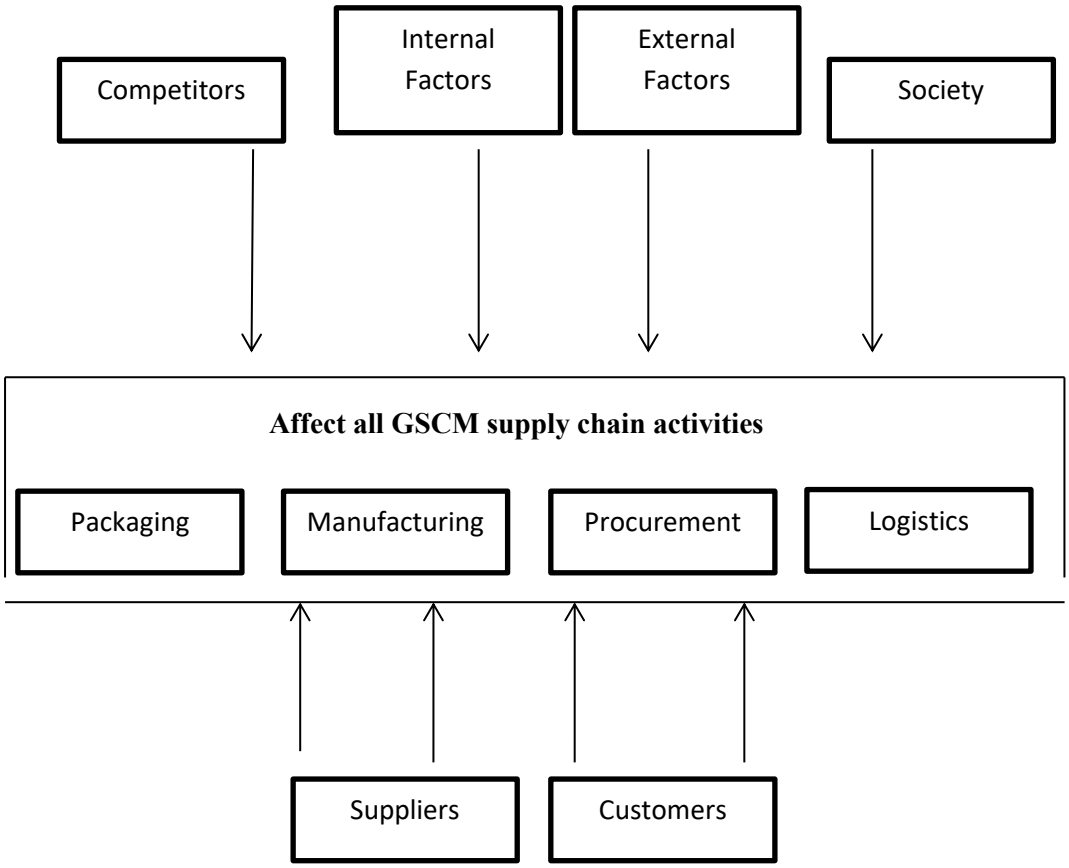
Questions	Section
Is the pharmaceutical industry in South Africa favourable for GSCM initiatives? Does the competition in South Africa affect Cipla Medpro's ability to implement GSCM initiatives?	Section 3.3 and 3.4
Are pharmaceutical supply chains favourable for implementing GSCM initiatives?	Section 3.4 and 3.6
What are some of the factors that affect Cipla Medpro Manufacturing? What factors affect each department? (procurement, logistics and planning) What are the key factors affecting these departments factors?	Section 3.5
What GSCM initiatives does each department have? (procurement, logistics and planning) Do these initiatives affect operations?	Section 3.7
Do global factors such as the overpopulation, food and water shortages, land use and climate change affect GSCM initiatives at Cipla Medpro Manufacturing? Would you say that these factors have a positive or negative effect on GSCM initiatives overall?	Section 3.3

Source: Compiled by researcher (2016)

3.10 VISUAL SUMMARY

From this chapter a visual summary, figure 3.2 is compiled. It lists the factors (see table 3.4), that impact negatively on the GSCM initiatives in the pharmaceutical industry. The factors have been grouped as per table 3.4. It highlights the challenges that the supply chain activities face in order to successfully implement GSCM initiatives within the pharmaceutical industry.

Figure 3.2: Factors that affect Supply Chain activities in GSCM Initiatives



Source: Compiled by researcher (2016)

3.11 CONCLUSION

This chapter provided a background of the pharmaceutical industry in order to get an overall understanding of what the pharmaceutical industry encapsulates and to identify why pharmaceutical chains are unlike normal supply chains. The chapter begins with an overview of the international pharmaceutical industry and identifies what GDP contribution it makes to global economy as well as which are the top global pharmaceutical companies. This chapter then moves on to identify and explain the pharmaceutical industry in South Africa and the top companies that operate within South Africa. The GSCM initiatives used by pharmaceutical industries are then identified and explained. The chapter concludes with the identification of factors that affect the pharmaceutical industry and GSCM within the pharmaceutical industry and a visual summary of these factors. The next chapter deals with the research methodology that used in this study and the framework that was followed.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

The previous chapters discussed the literature that this study used to develop a conceptual framework. Chapter 4 deals with the research process that was followed in this study and the methodology used to answer to research questions. Key information about the research methodology that was used in this study is explained in this chapter as it created a foundation for the researcher to follow when conducting the study. This chapter revisits the research questions and objectives of this study and presents the techniques that were used in this study to achieve its objectives, including the data analysis method used. Aspects such as the techniques of sampling, data collection methods and the participants of the study are also dealt with together with the reasons behind selecting these techniques.

4.2 REVISITING THE RESEARCH QUESTIONS AND RESEARCH OBJECTIVES

4.2.1 Research Questions

1. How does green supply chain management function within the planning, procurement and logistics departments at Cipla Medpro?
2. What are the factors that affect green supply chain management in the planning, procurement and logistics departments at Cipla Medpro?
3. What are the procedures Cipla Medpro has in place to overcome the factors that negatively impact on green supply chain management in the planning, procurement and logistics departments?
4. If there are procedures in place, can you provide insight into these procedures?

4.2.2 Research Objectives

The objectives of this study were:

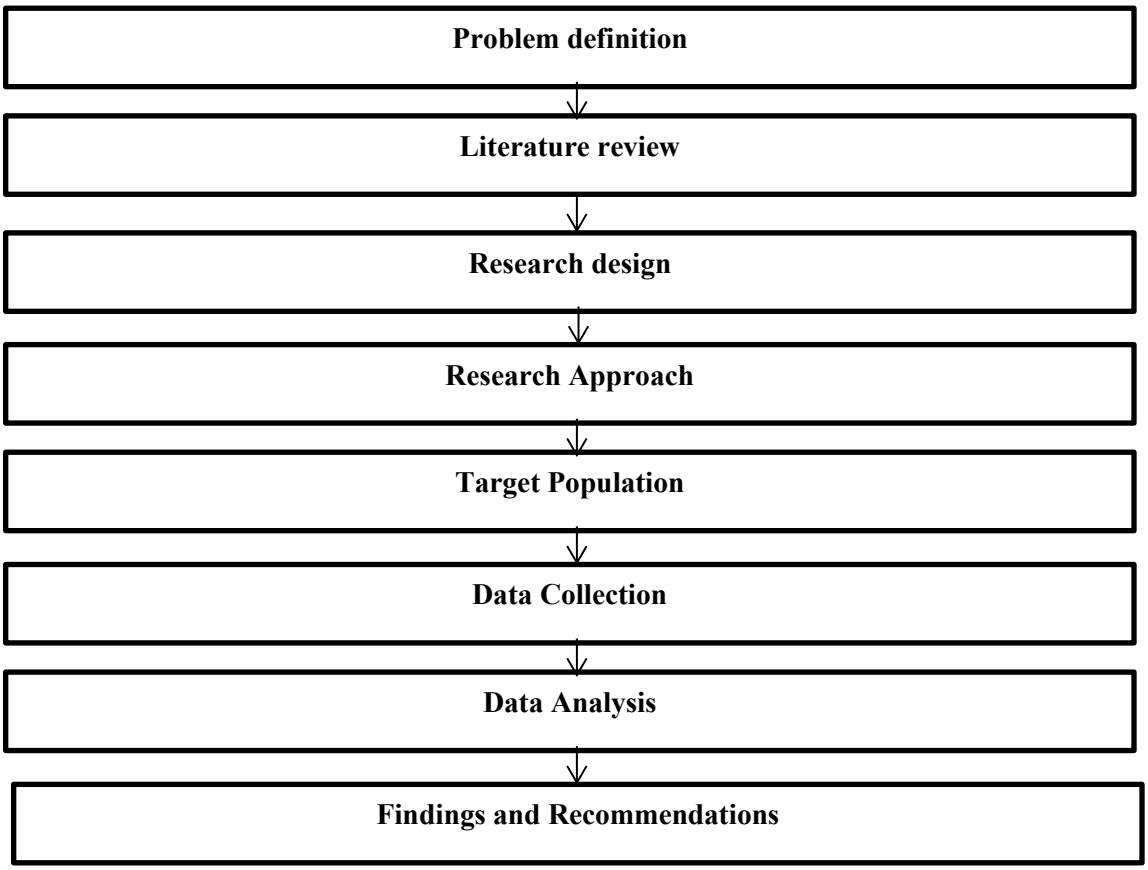
1. To provide insight into the green supply chain management initiatives in the planning, procurement and logistics departments at Cipla Medpro.
2. To identify the factors affecting green supply chain management initiatives in the planning, procurement and logistics departments at Cipla Medpro.
3. To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on green supply chain management in the planning, procurement, logistics departments.

4. If Cipla Medpro has such procedures in place, to provide insight into the various procedures they have in place.

4.3 RESEARCH PROCESS

The aim of a research process is to set a framework for the study and to guide the study throughout the planning and implementation stages (Oosthuizen, 2009:88). The research process of the study consists of step-by-step guidelines in order to gather data for analysis so that the research questions can be answered and a conclusion arrived at. This study followed these guidelines throughout the study depicted in figure 4.1. .

Figure 4.1: Research Process



Source: Sekaran and Bougie (2013:49)

Figure 4.1 lists the stages in the research process that the researcher followed during the study. The process started with the identification of the research problem and was then analysed using a review of literature dealing with the problem. The next stage was the designing of the research design that this study would follow to achieve its objectives. The research approach identified the target population.

This was followed by the actual data collection from Cipla Medpro Manufacturing and analysis of the data using the selected data analysis techniques. The research was then concluded with the explanation of the findings and recommendations by the researcher.

4.4 RESEARCH DESIGN

A research design is the plan or outline that researcher will use to fulfil the objectives of his research objectives (Myers, Well & Lorch, 2010:3). According to Bougie and Sekaran (2013:94), a research design includes the stages that will be followed to gather the required information and analyse it to achieve the objectives of the research. The research design covers issues pertaining to the study such as the purpose of the study, in which location it will be conducted, the type of investigation that it will be and the technique that will be used to analyse the data (Bougie & Sekaran, 2013:94).

This study is exploratory and descriptive. Descriptive research aims to describe what is – it is concerned with current relationships, opinions, and trends but also takes past occurrences into consideration, and if they could affect the current state of relations (Singh & Bajpai, 2007:8). According to Mugabe (2013:18), a descriptive research is focused on the gathering of information about situations for interpretation and description. Descriptive research does not just accumulate and tabulate facts but it also identifies trends and relationships (Mugabe, 2013:18). A descriptive study is undertaken to identify and describe the characteristics of variables of focus within a study (Ghauri, 2004:15). The purpose of a descriptive study is to describe the relevant aspects of the occurrence of interest from an individual, organisation or other perspective (Ghauri, 2004:15).

An exploratory study is a study that is conducted when not much is known about the subject at hand (Bougie & Sekaran, 2013:96). According to Kothari (2004:4), exploratory research is used to develop a hypothesis rather than test a hypothesis. Exploratory studies are undertaken to improve the understanding of the nature of the problem when not many studies have been conducted to answer the questions of the proposed study (Bougie & Sekaran, 2013:96). The main objective of an exploratory study is to identify researchable problems, in the case of this study it is used to identify what factors affect GSCM initiatives at Cipla Medpro Manufacturing (Krishnaswamy, Sivakumar & Mathirajan, 2009:161). Exploratory studies are also necessary when facts are known but there is a need to gather more information to create a viable theoretical framework (Bougie & Sekaran, 2013:96). According to Krishnaswamy *et al.* (2009:161), exploratory studies are flexible and have no fixed design; it changes as the area of research becomes clearer and can be used in a two-part study to initially identify a phenomenon.

The reasoning as to why this study is descriptive and exploratory is because the study aims to identify the factors that affect GSCM initiatives within Cipla Medpro Manufacturing as well as to identify and describe how these factors affect GSCM initiatives. Therefore the study is also exploratory because it aims to identify the factors that affect GSCM initiatives as not much is known about them. It is descriptive as it is using information from employees in order to describe and identify how these factors affect GSCM initiatives at Cipla Medpro Manufacturing.

4.5 RESEARCH APPROACH

There are three main types of research, namely, a quantitative, a qualitative and a mixed methods approach. Each approach is used to achieve different goals of different research and their suitability varies between research objectives.

4.5.1 Qualitative research

According to Brantlinger, Jimenez, Klingner, Pugach and Richardson (2005:195), qualitative research can be identified as understanding the qualities or essence of a phenomenon within a specific context. Qualitative research focuses on engrossing the researcher in a scene in order to deliberate or make sense of it (Tracy, 2012:3). Qualitative data is data in the form of words (Myers, 1997:3). Qualitative research identifies the views of individuals, under real world conditions (Yin, 2015:7).

4.5.2 Quantitative Research

Quantitative research is a research approach that yields data that can be counted or measured in order to derive a conclusion (Hoe & Hoare, 2012:55). Quantitative research is often used to test hypothesis and the results are often generalisable to larger populations (Bölte, 2014:67). Quantitative data can be counted or measured and are often used to determine relationships between variables and measure the frequency of observations (Hoe & Hoare, 2012:55).

4.5.3 Mixed Methods Approach

A mixed methods approach is a combination of both the qualitative approach and quantitative research approaches. In the mixed methods approach qualitative approaches are often used to identify a phenomenon and convert it into data that can be used by quantitative techniques to measure the data (Hoe & Hoare, 2012:55).

4.5.4 Research Approach used in the Study

This study adopted a qualitative, case study research approach. This study used a qualitative research approach because the aim of the study was to identify the factors affecting GSCM initiatives by interviewing employees and gathering data in the form of words. Qualitative research can come from a variety of sources such as government publications, individuals and focus groups, to name a few (Bougie & Sekaran, 2013:337). Some of the strengths of qualitative research are:

1. Qualitative research represents the perspective views of people and therefore gives a current realistic view of a phenomenon (Yin, 2015:7-8).
2. Assists the researcher to understand the characteristics of a group in a given situation (Taylor *et al.,* 2015:8). Creates openness thus allowing for a variety of answers and a better understanding of the subject or occurrence (Bougie & Sekaran, 2013: 337).
3. Qualitative research can uncover significant issues that can be used for future studies (Tracy, 2012:6).
4. Aspects that are not identified in quantitative research such as the culture of an organisation can be identified and measured to give a more realistic and holistic study (Ulin *et al.,* 2012:4).
5. The data acquired from qualitative research is dependent on human experience and is therefore more in-depth than data gathered through quantitative research methods (Taylor *et al.,* 2015:9).
6. Qualitative research strives to collect data from various sources rather than a single source, this improves the accuracy and dependability of a study (Yin, 2015:8).

The above mentioned strengths of qualitative research assure that this research approach was appropriate approach to achieve the objectives of this study.

4.6 TARGET POPULATION

The target population refers to the entire group of people, events or subjects of interest that the researcher wants to investigate (Bougie & Sekaran, 2013:239-240). An element is one member of a population. The target population form the pool of subjects or events that the investigator aims to explain, quantify or obtain data from in order to make an analysis or conclusion (Schindler & Cooper, 2005:370). The target population for this study included the SCM staff at Cipla Durban branch. The reasoning behind selecting the Cipla Mobeni branch as the study site is because it is one of the key manufacturing pharmaceutical plants in South Africa.

4.6.1 Sampling Techniques

A sample is a subgroup of a population (Schindler & Cooper, 2005:364). Basically a sample is the members or elements that have been selected from the population to be investigated (Bougie & Sekaran, 2013:241). Different techniques are used to determine which elements of the population will be selected for the sample (Marschan-Piekkari & Welch, 2004:175). These techniques are called sampling techniques. Sampling techniques can be divided into two groups, known as probability and non-probability sampling techniques. In probability sampling each element of a population has an equal chance to be selected to be a part of the investigation.

4.6.2 Probability and Non-probability Sampling

Probability sampling is used when all members of the population have the required knowledge and information needed by the researcher but the population is large and researching each member of the population will be too time consuming (Bougie & Sekaran, 2013:247). Non-probability sampling is when not all members of a population have an equal chance to be selected to be in the sample (Marschan-Piekkari & Welch, 2004:190). This technique is used when only a limited number of members in a population have the information that the researcher seeks (Kothari, 2004:15). For this study a non-probability sampling technique was used because only some elements of the population obtained the information required by the researcher.

Non-probability sampling is also known as deliberate sampling because it encompasses the deliberate or purposive selection units within the universe to constitute the sample for a study (Kothari, 2004:15). Non-probability sampling occurs when individuals of a population do not have an equal chance to be selected (McMurray, 2004:81). In this selection technique, all the elements in a population do not have even probabilities to be chosen as sample subjects because only information from specific individuals is needed for the research (Marschan-Piekkari & Welch, 2004:190). According to Bougie and Sekaran (2013:252), non-probability purposive sampling is used when sampling is restricted to specific groups of people that can provide the desired information to the researcher. Non-probability sampling designs can be further divided into two broad categories, namely, (1) convenience sampling, and (2) purposive sampling.

1. **Convenience Sampling -** Is the collection of data from members that is easily accessible or conveniently available. This method is used to get information quick and efficiently.
2. **Purposive Sampling -** Is a technique used to collect data from specific individuals because only they have it or they meet certain standards set by the researcher.

Bougie and Sekaran (2013:252)

Purposive sampling can then be further broken down into two groups of sub-techniques, namely, judgement and quota sampling.

4.6.2.1 Quota Sampling

Quota sampling is used in a study to ensure that certain groups in a population are adequately represented. The population is divided into subgroups and each subgroup has a fixed quota of the number of members that will be selected (Marschan-Piekkari & Welch, 2004:193). Quota sampling is still a non-probability sampling technique and even though members of each subgroup are investigated the results are not generalisable (Bougie & Sekaran, 2013:252).

4.6.2.2 Judgement Sampling

Judgement sampling involves a choice of subjects that are in the best position to provide the information required (Beri, 2013: 197). In judgement sampling the researcher selects the sample which he/she identifies as accurate representatives of the population (Kothari, 2004:15). According to McMurray (2004:84), in judgement sampling the sample is based on the judgement of the researcher and can be open to question. Judgement sampling is used when a limited number of people have the information that is sought by the researcher (Bougie & Sekaran, 2013:252).

4.6.3 Selection Techniques

A non-probability purposive sampling technique was used to select the departments. The reason for the use of this technique is because only personnel with the required information are required in the study, namely, SCM staff. The subset of non-probability purposive sampling used was that of judgement sampling. This is because the individuals selected to be part of the sample was determined by the judgement of the researcher. The sampling was confined to specific groups of individuals because only these individuals have the required information for the study. Individuals that do not have knowledge of SCM would not be able to answer questions on GSCM. Only individuals with expert knowledge who can contribute meaningful information to the study were selected to partake of the study. For this study the supply chain department has been segregated into different departments namely: Procurement, Planning and Logistics. Then from these groups all personnel were included to partake in the study (a census sample). This is because (1) the number of personnel in the respective departments is small; and (2) these individuals have expert knowledge and have gone through experiences that will provide important data for the study.

This study comprises of the supply chain staff from three departments which are the planning, procurement and logistics department. The reason being is that these departments have been identified, in chapter 2, as essential departments in the implementation of GSCM. All the members of the respective departments were selected with the omission of floor staff such as stores controllers. The

reason for the omission of these employees is because they have little or no knowledge of GSCM initiatives within Cipla Medpro Manufacturing. A total of ten staff members across the three operational areas participated in the study. In order to ensure that data is reliable and contains only information that is pertinent, only the most relevant departments must be used (Pertamin Hulu Energi, 2012: 5-6). Departments that have smaller, less influential roles have been omitted from the target population.

The Cipla Durban branch also sources its raw materials from various countries including depots in India. This means that the supply chain staff at the Durban branch must be incorporated within business operations and be highly skilled in order to successfully carry out the objectives of its robust supply chain. Therefore participants must be integrated within Cipla and must have a sound understanding of SCM.

4.6.4 Participants

As discussed under the sampling section, for this study, all the personnel in the procurement, planning and logistics departments at the Cipla Durban branch were interviewed. The reasoning behind the selection of these departments is because they have been identified as key departments affecting GSCM initiatives (refer to sections 2.3 and 2.4 in chapter 2). The reason for the selection of all the members of these respective departments is because the number of individuals in these departments is small. Therefore it is possible to interview all the members of the target group. This will facilitate for a more accurate study as all the individuals would have given their input. Table 4.1 lists the number of participants that participated in this study:

Table 4.1: Participants

Department	**Number of individuals working in respective departments and selected**
Planning	1
Procurement	5
Logistics	4
Total	**10**

Compiled by researcher (2016)

4.6.5 Method or Approach

Cipla Medpro Manufacturing was contacted via email initially to propose the study to the senior management and determine whether conducting the study at the Mobeni branch was a possibility. The details pertaining to the research were then discussed with the public relations personnel. Information such as background and purpose of the study was discussed in context. Once the proposal was accepted

by Cipla Medpro Manufacturing Mobeni they signed and stamped the gatekeepers letter granting the researcher access to the required information. Once UKZN had given the researcher ethical clearance, interviews were conducted at Cipla Medpro Manufacturing Mobeni.

4.7 DATA COLLECTION

Semi-structured interviews using a semi-structured interview guide was used to collect the primary data. The reason for the use of this instrument is because it allows the study to be conducted by keeping the questions limited to only those that are of value to the study (Flick *et al.,* 2004:268). According to Raworth *et al.* (2012:1), a semi-structured interview is a commonly used technique in development research. A semi-structured interview does not use set questions, instead it focuses on specific topics but covers them in a conversational technique (Raworth *et al*., 2012:1). In a semi-structured interview the questions are not as fixed as it is for structured interviews and allows for some freedom to vary the course of the interview (Schuh, 2011). According to Galletta (2013:24), semi-structured interviews are adequately structured to focus on a specific topic but also facilitates for the participants to offer new areas of focus for the study. A semi-structured interview focuses on a specific theme but discusses them in a conversational style (Raworth *et al.*, 2012:1). A semi-structured interview is also used when the interviewer knows what information is required but wants to probe deeper into a phenomenon or occurrence (Gelletta, 2013:37). The interview guide consists of open-ended questions. The reason for the use of a semi-structured interview is to focus on a specific topic but also to facilitate for a change in the direction of the interview in order to achieve the objectives of the study. This is important because the researcher is conducting exploratory and descriptive research.

Table 4.2 indicates the sections and the secondary sources used to compile the semi-structured interview guide. As can be seen, the research objectives of this study are linked to respective questions. This was done to ensure that the research objectives would be achieved and thus the research questions answered conclusively.

Table 4.2: Questions Included in the Semi-structured Interview Guide

Research Objective	Questions	Sections	Sources
To provide insight into the GSCM initiatives in the planning, procurement, and logistics departments at Cipla Medpro.	• Is your department involved in any green initiatives? • If yes, what are they? • Can you provide a brief description of these initiatives? • Do these initiatives benefit or hinder Cipla Mobeni overall?	Section 2.6 and Section 3.7	Narayana *et al.,* (2014) Sellitto *et al.,* (2015) Zsidisin and Siferd (2001) Kumar and Chandrakar (2012) Dhull and Narwal (2016) Faisal (2015)

	• Are these GSCM initiatives regional or international? • Do staff members provide input into GSCM initiatives or is it generated by top management? • Is there any way to convey your ideas to the decision makers? • If you have a green initiative idea, how receptive do you think management would be to such an idea?		
To identify the factors affecting GSCM initiatives in the planning, procurement and logistics departments at Cipla Medpro.	• What are the factors that affect the Cipla Medpro Manufacturing? Are these contributing factors? • Could these factors affect GSCM initiatives? How so? • Are there any other factors that affect Cipla Medpro? • Do these factors affect GSCM initiatives? • How do these factors affect GSCM initiatives? • In your opinion, what is the most critical factor that affects Cipla Medpro manufacturing? Can you elaborate? • Does this factor negatively or positively affect GSCMinitiatives at Cipla Medpro Manufacturing?	Section 2.9, Section 2.10, Section 3.3 & Section 3.5	Diabat and Govindan (2011) Zhu *et al.,* (2005) Khiewnavawongsa & Schmidt (2013), Walker *et al*. (2008), Liu *et al*. (2012), Sari (2012), Routroy (2009), Lee (2008), Vachon (2008), Kumar and Chandrakar (2012), Godfray *et al.,* (2010), Foley *et al.,* (2005), Mellino and Ulgiati (2015), Narayana *et al.,* (2014), Rossetti *et al.* (2011) Zigiaris (2000)
To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on GSCM in the planning, procurement, logistics departments	• What procedures does Cipla Medpro Manufacturing have in place to overcome the factors that negatively affect GSCMinitiatives?	Section 2.11, Section 3.3 and Section 3.4	Griskevicius *et al.* (2010), Kumar and Chandrakar (2012) Vachon and Klassen (2006) Zsidisin & Siferd (2001),

			Stern (2006), Kopnina and Washington (2016), Orrell *et al.* (2003)
If Cipla Medpro has such procedures in place, to provide insight into the procedures.	• In your view, do these procedures successfully combat these negative factors? • Are there any suggestions that you have identified to better combat these negative factors? • How receptive are the decision makers to your ideas?	Section 2.11	Griskevicius, Tybur and Van den Bergh (2010), Kumar and Chandrakar (2012) Vachon and Klassen (2006) Zsidisin and Siferd (2001)

Source: Compiled by the research (2016)

4.7.1 Pre-Testing of Semi-Structured Guide

It is important to ensure that the interview guide is tested before it is used in the field of study. According to Collins (2003:230), if interview guides are not tested errors can occur with the interview which can confuse the participants and influence results. Some of these errors are highlighted below:

- Questions could be worded incorrectly.
- Questions can be misleading and not deal with the topic being discussed.
- Questions could lead the participants to answer in a way that influences their answers.

Collins (2003:230)

The use of pre-testing is that it allows the researcher to identify the shortfalls of their interview guide and gain insight on the relevance of their interview questions (Van Teijlingen & Hundley, 2002:3).

This study was pre-tested by two senior academics from the School of Management, Information Technology and Governance. Questions and interview structure were amended by restructuring questions that where leading, ambiguous and poorly worded. Questions that where not linked to the research objectives were removed from the interview guide..

4.7.2 Conducting the Interviews

The interviews were conducted through the time span of an eight hour day. The researcher was provided a room for conducting the interviews so that the interview process could be conducted without any disruptions. Once the researcher arrived on site at Cipla Medpro Manufacturing Mobeni it was identified that only 9 participants were going to participate in the study. The reasoning behind this is

that the planning function was now moved to the warehouse department and one of the current participants from the warehouse department was in charge of this functional area as well.

Each interview began with an introduction by the interviewer on the purpose of this study and the role of each participant. This was then followed by the questions set in the interview guide. Three out of the nine participants did not want their interview recorded and the researcher had to transcribe their answers during the interview process.

The interviews went by departments and the warehouse department participants were the first to be interviewed followed by the planner and the procurement department. After the interviews were conducted each participant was allowed to pose any questions to the researcher about the interview.

4.8 DATA QUALITY

Rigor is essential to prevent errors occurring in a study, the rigor and accuracy of this study is evaluated using Guba's model of trustworthiness (MacLeod, 2008:92). The reason for the use in this model is because it tests the rigor on four different characteristics to ensure data quality is maintained. His model outlines four aspects of trustworthiness, namely, credibility, dependability, transferability and conformability (Guba, 1981:80).

According to Polit and Beck (2008:539), credibility can be identified as the prime goal of research. Credibility is aligned with internal validity (Shenton, 2004:64). Credibility ensures that the study is able to measure what it was established to study. Incorporating credibility is an essential factor for instituting trustworthiness (Guba, 1981:80). Credibility can also be identified as the confidence in the truth of the data (Polit & Beck, 2008:539).

Dependability ensures that the study is reliable (Krefting, 1991:217). This means that if the study was to be repeated in the same context, using the same methods and the same participants the results obtained would be similar (Shenton, 2004:71). Dependability and credibility are closely related to each other (Krefting, 1991:217). Credibility cannot be achieved without dependability (Polit & Beck, 2008:539).

Transferability refers to external validity or generalisability (Guba, 1981:80). Transferability refers to the ability of the proposed study to be applied to other situations (Shenton, 2004:70). It is therefore the responsibility of the researcher to ensure that there is sufficient contextual material about the research area for the reader to make a transfer (Polit & Beck, 2008:539).

Conformability refers to objectivity of the study (Guba, 1981:80). This ensures that steps have been taken to make the study's findings a result of the participant's ideas and experiences rather than the

preferences of the researcher (Shenton, 2004:71). Conformability ensures that the data reflects the information provided from the participant and not that of the researcher (Polit & Beck, 2008:539).

To ensure credibility the researcher incorporated a strategy known as member checking. Participants answers are summarised and articulated to ensure that it has been appropriately understood. To incorporate conformability the interviewer kept a thoughtful diary after each interview to ensure a deep analysis. The researcher also recorded the answers of the participants to ensure that the data is accurate and conformable.

4.9 DATA ANALYSIS

Data is analysed using content analysis (Bougie & Sekaran, 2013:352). Content analysis is used to "see the meaning" in data obtained from verbal dialogue, visual depictions and written documents (Krippendorff, 2012:404). The data analysed for this study is from semi-structured interviews consisting of open-ended questions. Content analysis is an observational research method that is used to analyse information from interview recordings, newspapers, websites and similar information sources (Elo & Kyngäs, 2008:108). This method of analysis enables the researcher to analyse data from textual information and its properties (Bougie & Sekaran, 2013:352). This is to identify the presence of certain words, characters, concepts, sentences and themes (Elo & Kyngäs, 2008:108). The answers from the interview have been tabulated into meaningful information to identify patterns in information. From this stage, content analysis is used to identify trends and patterns in the data obtained and answer the research questions that this study seeks to answer.

In order to analyse the data, interviews were recorded using a voice recorder. Interviews were then transcribed verbatim. Once this was done, the researcher listened to the recordings again to make sure that the data was transcribed accurately. The researcher then read through the transcripts line by line. Any data that could not be linked back to the study was discarded. Relevant data was categorised and unitised into themes.

4.9.1 The Process of Transcribing the Voice Recordings

The data was transcribed with the assistance of a windows programme known as "Listen n' Write". This programme facilitates for effective transcribing through assistive tools such as keyboard shortcuts to play, pause or jump backwards or forwards in the recording. The recording was easily transcribed using this application as the recording was played slowly and data was recorded accurately. The data from the recording was transcribed onto different data sheets.

4.9.2 Content Analysis of the Transcribed Data

The data that was transcribed from the recordings was then reviewed and placed according to the departments that the participant was from. The information was then reviewed through content analysis to identify key words, concepts, sentences and related themes. The data was then tabulated. From these tables the researcher identified patterns in key terms and sentences and put them into context. This was then used to answer the research objectives and derive conclusions.

4.10 CONCLUSION

This chapter presented the research methodology used in this study. This chapter begins with the identification of the research process that the study followed and then moved on to the research design. The target population and selection processes were then stated and the reasoning behind the methods used was explained. This chapter concluded with an explanation of how this study proposed to collect data, ensure data quality and the method used to analyse the data. The next chapter, chapter 5 presents the data analysis, findings and the discussion thereof.

CHAPTER 5: ANALYSIS AND DISCUSSION OF DATA

5.1 INTRODUCTION

This chapter commences by revisiting the research objectives stated in chapter 1 and 4. Chapter 1 introduced the research questions and the objectives of the research. Chapter 2 presented the literature that dealt with the factors impacting GSCM. Chapter 3 focussed on explaining GSCM within the pharmaceutical industry as well as the core factors affecting GSCM. The previous Chapter discussed the research methodology that the study followed.

In this chapter, the analysis of the data that was collected at Cipla Medpro Manufacturing is presented. Firstly, each section is stated with its purpose, followed by the participants' responses and finally, an overview and discussion of the results.

5.2 REVISITING THE RESEARCH OBJECTIVES

Before presenting the data analysis and findings it is appropriate to re-visit the research objectives to set the scene. Table 5.1 provides a summary of the research objectives and the sections in the chapters that relate to the attainment thereof.

Table 5.1: Research Objectives and the Sections that Covered the Objectives

Research Objective	Secondary Data	Empirical Data
To provide insight into the GSCM in the planning, procurement, and logistics departments at Cipla Medpro	Chapter 2: Section 2.6	Chapter 5: Table 5.4 Section 5.5
To identify the factors affecting GSCM initiatives in the planning, procurement and logistics departments at Cipla Medpro.	Chapters 2: Section 2.9 Chapter 3: Section 3.3; 3.4; 3.5 & 3.6	Chapter 5: Table 5.5 & Table 5.6; Table 5.7 Sections 5.6; 5.7 & 5.8
To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on GSCMin the planning, procurement and logistics departments.	Chapter 2: Section 2.11 Chapter 3: Section 3.7	Chapter 5: Table 5.8 Section 5.9
If Cipla Medpro has such procedures in place, to provide insight into these procedures.	Chapter 2: Section 2.11 Chapter 3: Section 3.7	

Source: Compiled by researcher (2016)

5.3. ANALYSIS OF QUESTIONS AND RESULTS

Each section in the interview guide focused on a different aspect of GSCM initiatives at Cipla Medpro Manufacturing, which has been modelled from questions derived from the theoretical framework in Chapters 1 and 2. Table 5.2 identifies the key focus areas of each section.

Table 5.2: Focus of Each Section of the Interview

SECTION	FOCUS OF THE SECTION
Section 1	Profile of Participants
Section 2	Identification of Cipla Medpro Manufacturing's green initiatives
Section 3	The pharmaceutical industry in South Africa and its compatibility with GSCM initiatives
Section 4	Global factors and their effect on GSCM initiatives
Section 5	Factors that negatively affect GSCM initiatives at Cipla Medpro
Section 6	What procedures does Cipla Medpro Manufacturing have in place to overcome the factors that negatively affect GSCM initiatives

Source: Compiled by researcher (2016)

The aim of each section and their questions is identified and followed by the results gathered from the study. Data that did not pertain to the aim of each section has been omitted.

5.4 PROFILE OF PARTICPANTS

Table 5.3 presents the profile of the participants who took part in this study. It includes the profile of each participant which consists of the recorded data of each participant's position held in the company, the number of years worked in the company, the number of employees in the participant's department and the participant's highest level of education.

Table 5.3: Profile of the Participants.

Participant (N=9)	Position	Department	Years in company	Highest level of education	Number of employees in department
Participant 1	Buyer	Procurement	11	Matric	5
Participant 2	Team Leader	Warehouse	1	Diploma	23
Participant 3	Team Leader	Warehouse and planning	1	Undergraduate Degree	23
Participant 4	Senior Buyer	Procurement	4	Diploma	5
Participant 5	Buyer	Procurement	7	Matric	5
Participant 6	Junior Buyer	Procurement	2	Undergraduate Degree	5
Participant 7	Warehouse Manager	Warehouse	5	Diploma	22
Participant 8	Buyer	Procurement	10	Diploma	7
Participant 9	Team Leader	Warehouse	12	Matric	23

Source: Compiled by researcher (2016)

5.5 SECTION 2 - IDENTIFICATION OF CIPLA MEDPRO MANUFACTURING'S GREEN INTIATIVES

The aim of this section was to determine what GSCM initiatives Cipla Medpro has in place, to identify what the initiatives perceived effect is on Cipla Medpro Manufacturing and whether management are receptive to the ideas that SCM staff have on improving existing initiatives or introducing new GSCM initiatives. The results for this section are presented and tabulated in table 5.4. Insight is provided into the green initiatives by Cipla Medpro Manufacturing's SCM department and the approach taken by management towards GSCM initiatives.

Table 5.4: Cipla's Medpro Manufacturing's Green Initiatives

Participant (N = 9)	Department	Involvement in green initiatives	Green Initiative	Benefit
Participant 1	Procurement	Yes	Consolidate loads to reduce carbon emission Procurement of virgin materials that are biodegradable	Yes Yes
Participant 2	Warehouse	Yes	Recycling of waste / Recycle bins on site	Yes Yes
Participant 3	Warehouse and planning	Yes	Consolidate deliveries to reduce carbon emission Procure from local suppliers	Yes Yes
Participant 4	Procurement	Yes	ISO14001 suppliers and green purchasing	Yes
Participant 5	Procurement	Yes	ISO14001 suppliers and green purchasing Capacity planning	Yes Yes
Participant 6	Procurement	Yes	ISO14001 suppliers and green purchasing	Yes
Participant 7	Warehouse	Yes	Reduce amount of change overs/ Reduce wastage of water / Reduce wastage of chemicals / To not underutilise vehicles – consolidate loads	Yes Yes Yes Yes
Participant 8	Procurement	Yes	Reducing amount of colour on labels and cartons	Yes
Participant 9	Warehouse	Yes	Minimise Loads	Yes

Source: Compiled by researcher (2016)

As can be seen from table 5.4, all participants are involved in different green initiatives depending on their department. They are also aware of the green initiatives in other departments at Cipla Medpro Manufacturing. Each green initiative is dealt with hereafter.

- **Consolidate deliveries to reduce carbon emission and utilisation of vehicles**

Cipla Medpro Manufacturing recently combined their warehouse and planning departments in order to improve operations. This facilitates for the implementation of their GSCM initiatives, which are capacity planning and consolidation. The consolidation of loads is basically the maximisation of truck loads to ensure fewer deliveries. Participant 1 remarked:

"*We consolidate loads to reduce carbon emissions by having fewer deliveries".*

whilst participant 9 said:

"*We try to minimise loads coming in by filling the trucks. Thursdays we have a meeting with supply chain and pull out the reports with the required production for the week. We sit with the team and we plan the amount of deliveries. Sometimes there are issues such as urgent deliveries. We have to accept the loads and find staff to receive it, but we are trying to eliminate those urgent loads and overtime*".

From table 5.4 it can be seen that four participants identified consolidation as a green initiative that they are involved in.

- **Procurement of virgin materials that are biodegradable**

The use of virgin materials is also a GSCM technique used by Cipla Medpro Manufacturing. This is the use of packaging material that is biodegradable and therefore more environmentally friendly. Participant 1 stated:

"We also buy virgin material so it is bio-degradable purchasing, so that is what you call green purchasing, especially our boards we use virgin material so it is non-recyclable but it is bio-degradable so even if it goes to a landfill site it will degrade".

This finding identifies that Cipla Medpro Manufacturing is also incorporating sustainability through their product packaging.

- **Recycle bins on site and Recycling of waste**

Another initiative used by Cipla Medpro is the introduction of recycling bins on site and the introduction of awareness posters to promote recycling and sustainability throughout the organisation and its employees. As stated by participant 7:

"*We are also working on things like recycling, reduction of electricity usage*".

From the findings it can be concluded that Cipla Medpro's aim is to promote sustainability within the company.

- **Procure from local suppliers**

The use of local suppliers (Table 5.4) is also an initiative to improve their environmental performance. As stated by participant 3**:**

"*By using local suppliers we help the economy and we don't have too much of emissions coming from transport such as planes*".

The findings discussed above are in line with Ubeda *et al.* (2011:44) who identified a GSCM initiative called "*green transportation and distribution*" whereby businesses minimise their impact on the environment by transporting goods and materials in the most environmentally responsible method that is available to them. For example, the consolidation of loads to reduce carbon emissions and procuring from local suppliers.

- **ISO14001 suppliers and green purchasing**

Another key GSCM initiative identified by four of the participants (Table 5.4) was green procurement. Green procurement initiatives focus on the purchasing of bio-degradable materials with regard to their packaging and also from purchasing from suppliers that are ISO 14001 certified. This is to make sure that these suppliers are environmentally responsible. Participant 6 remarked:

"*We buy from suppliers that are ISO 14001 certified, generally speaking most of our packaging material and raw material suppliers have some standard, quality standards with their company, like ISO 14000 is basically for the environmental quality standards*".

Since Cipla Medpro Manufacturing is an international company and a leading pharmaceutical manufacturer in South Africa, they select their suppliers according to high standards set within their respective organisation. It was also found that they strive to protect the environment through innovations by management and employees such as purchasing materials that are bio-degradable whilst maintaining product quality. For example, Participant 1 stated that:

"*We also buy virgin material so it is bio-degradable purchasing, so that is what you call green purchasing, especially our boards we use virgin material so it is non-recyclable but it is bio-degradable so even if it goes to a landfill site it will degrade*".

According to the participants, many of these initiatives are driven by the organisation internally. Sellitto *et al.* (2015:4), Appolloni *et al.* (2014:3), Lacroix (2008:2) and Zsidisin and Siferd (2001:61) define green procurement as: "*a set of purchasing policies, relationships and actions taken in response to*

environmental concerns and why many organisations use this green initiative". In line with this, Cipla uses green procurement to ensure that the materials they purchase are environmentally responsible. Attar *et al.* (2016:48), Testa and Iraldo (2010:954), Kümmerer (2010:81&92) and Zsidisin and Siferd (2001:66) state that green packaging is used by companies to reduce their carbon footprint – that is why Cipla procures "virgin material" which is bio-degradable.

The participants also identified other initiatives that were cross-functional between departments. In table 5.4, four participants identified cross-functional green initiatives that they are either involved in or have knowledge of. Some of these initiatives included the reduction of the use of colours in their packaging to minimise the use of dyes that pollute the environment.

- **Capacity planning**

Capacity planning was identified by participant 5, who remarked that capacity planning assists Cipla Medpro to consolidate their loads as a green initiative by planning to maximise capacity.

As stated by participant 7:

"*From a delivery perspective we have a delivery plan for the whole month so that we don't underutilise vehicles*".

However, this initiative cannot be applied to all materials used by Cipla because certain materials cannot be mixed with others during transportation and require their own trucks. One of the participants explained that it is good manufacturing practice (GMP) to ensure that there is no mixing between raw materials in the pharmaceutical industry. This is especially for materials coming in powder form as these materials each have unique properties that can be compromised by mixing materials.

- **Reduce Waste**

Cipla Medpro Manufacturing also aims to reduce its impact on the environment through the incorporation of proper planning. Participant 7 remarked:

"we are now involved in planning as well, so the whole planning function has moved out of supply chain and into the warehousing and inventory management portfolio, so all the customer requests come to us now and we do the capacity planning and all of that, campaigns of products and all of that to reduce the amount of changeovers, wastage of water, wastage of chemicals, our usage of chemicals. Both also from a delivery perspective we have a delivery plan for the whole month so that we don't underutilise vehicles. Those are the two current ones that we are working on and also there are things like recycling and reduction of electricity usage".

From the above statement it can be seen that Cipla Medpro Manufacturing is attempting to reduce their waste overall as well.

- **Reducing amount of colour on labels and cartons**

As stated by participant 8:

"*On some of our cartons as well as some of our labels we use between four and five different colours and we are working on reducing that to one or two colours. I would imagine that the emissions or the dyes have a certain solvent or vapour that they release that affect the environment. Looking at it that way if you reduce the amount of colours you would reduce your footprint*."

5.5.1 Benefits of GSCM

All the participants are of the opinion that the identified initiatives benefit Cipla Medpro Manufacturing. Five participants remarked that one benefit of having GSCM initiatives is that these initiatives result in cost savings. Two participants observed that these initiatives help sustain the environment. Three participants identified that they have an overall positive effect on the businesses and social standing, whilst one participant stated that it reduces planning time. Participant 2 stated:

"*It helps the environment and helps Cipla because it improves our social standing with the community as well*".

Participant 3 remarked:

"*It actually reduces costs by saving on transport costs, also in terms of manpower hours it also helps us because if we get one delivery a week we can allocate people to that job on that day instead of having people going out to offload twice or three times a week, we can use those people elsewhere. And planning because we don't have to plan as much as for one delivery than for three or four*".

These findings link with the literature by Broek (2010:5), McCafferty (2015) and Ripton (2014) who listed that some of the benefits that international companies have been gaining from green initiatives are savings through recycling, cost reductions through the better use of resources and improved social standing.

5.5.2 Employee overview of Cipla Medpro Manufacturing's GSCM initiatives

Eight out of the nine participants indicated that GSCM initiatives are set by Cipla International and the local Cipla Medpro Manufacturing branch. Cipla International sets structures in place to ensure that branches in other parts of the world are involved in GSCM. However, Cipla International also facilitates for local branches to incorporate their own GSCM initiatives. As observed by participant 1:

"*Some are introduced by Cipla India but some are internal*",

whilst participant 5 stated,

"*I would say that it is driven by us locally as well, as much as its obviously international they would have put that in place before us, but no we are very much driven towards that*".

All the participants acknowledged that they can provide input into GSCM initiatives and that management is receptive to employees' ideas on environmental sustainability. For example, participant 4's idea on improving environmental sustainability is currently under review by top management. Participant 2 noted:

"*Ideas come from all departments, we share our idea with management and they pass it to top management, and management is receptive they give us feedback*",

whilst participant 7 stated that

"*With Cipla the whole philosophy is different, we are not only about having medication available to all, it's about also reviewing our impact all the time on this community/society/the environment*."

From the comments, it can be concluded that Cipla has an open structure and stance towards sustainability which employees have identified.

5.6 SECTION 3 - THE PHARMACEUTICAL INDUSTRY IN SOUTH AFRICA AND ITS COMPATIBILITY WITH GSCM INITIATIVES

The aim of this section was to determine whether the pharmaceutical industry is in a favourable position to implement GSCM initiatives and whether the regulations in the pharmaceutical industry affect GSCM initiatives positively or negatively. The results of section 3 have been tabulated and identified in table 5.5.

Table 5.5: The Pharmaceutical Industry's Compatibility with GSCM Initiatives

Participants (N=9)	Is the pharmaceutical industry in a favourable or unfavourable position with regard to GSCM initiatives?	Are regulations supportive or a hindrance?	Key regulations
Participant 1	Favourable	Supportive	Good Manufacturing Practices
Participant 2	Favourable	Supportive	Good Manufacturing Practices
Participant 3	Favourable	Supportive	Good Manufacturing Practices
Participant 4	Favourable	Supportive	Government legislation
Participant 5	Favourable	Supportive	Good Manufacturing Practices
Participant 6	Favourable	Supportive	Good Manufacturing Practices
Participant 7	Favourable	No impact	None
Participant 9	Unfavourable	Hindrance	Good Manufacturing Practices

Source: Source: Compiled by researcher (2016)

5.6.1 GSCM Initiatives

As can be seen from table 5.5, eight of the participants indicated that the pharmaceutical industry is in a favourable position to implement GSCM initiatives, whilst one participant remarked that is was unfavourable. The reasoning given by the eight participants for the favourable position, was that the pharmaceutical industry is a high waste producing industry and there are areas for improvement to reduce waste and pollution. Another reason was that government and governing bodies' legislation enforce proper waste management and disposal, making sustainable practices a necessity. Participant 1 remarked:

"I mean if we look at GMP which we must follow as a company, it identifies ways for us to dispose of our waste materials. It is already a requirement and there is a lot of ways that we can do GSCM because of recycling and things so yes, I definitely would say it is favourable. GMP is a critical piece of legislation because it governs us".

Participant 3 remarked:

"They are favourable because of GMP, you see it's a requirement so we must follow it. And it deals with disposing of waste and things so yeah it helps. So it's also the standards like ISO, so we are being governed for green things".

Participant 5 stated:

"I think it's feasible, it will have its benefits, and I think the other thing that we have to consider is that the country as a whole is expecting the pharmaceutical industry to gather pace, to become bigger and bigger, so that means more people have to buy into this initiative and like I said it's not necessarily something just to do for the company benefit, it's something that needs to be done on a global scale".

Participant 9 stated that it was unfavourable and remarked:

"It is difficult to do it especially with the demands for medicines because it has to follow GMP, because of the safety of the patient we must go through GMP first, whether it is suitable or not with regard to GMP".

The statements by eight out of the nine participants link with the literature by Attar *et al.* (2016:48) and Welter (2012) who are of the opinion that the pharmaceutical industry and other industries have similar GSCM initiatives, and that it is in fact suitable for this green initiative. Narayana *et al.* (2014), Faisal (2015), Angela (2013) and Xie and Breen (2012) emphasise that the pharmaceutical industry can successfully implement GSCM initiatives as remarked by the participants.

5.6.2 Government Legislation's Support of GSCM Initiatives

As can be seen from table 5.5, most of the participants (7) are of the opinion that government legislation supports GSCM initiatives. It is possible that without it pharmaceutical companies would not have incorporated sustainable practices into their organisation and that legislation and laws provide the foundation for the implementation of GSCM initiatives. One participant stated that government legislation had no effect on GSCM initiatives and another participant stated that it was a hindrance because it was time consuming. Participant 2 remarked:

"It is supportive because you need regulations to guide you so you know what you are doing especially in a business like pharmaceutics because people can die, and it deals with dangerous chemicals".

Participant 4 remarked:

"For the government, specifically for the tenders you know, they are the ones who are basically telling you what product to make, they are the customer, they say they want for instance, this pen, they can tell you what the construction of this pen needs to be and if they have the right procurement working with

them, they could go the green route cause not all green routes are expensive there's a lot of cheaper aspects on it".

However, Participant 7 remarked:

"Government had very old pharmaceutical regulations so there isn't really any drive as from the government side. I don't see any kind of impact to be honest with you, not anything I can see".

These findings are in line with the literature by Khiewnavawongsa and Schmidt (2013:226), Kumar and Chandrakar (2012:5) and Lee and Klassen (2008:575) who remark that government legislation is a key driver for GSCM initiatives. Lee and Klassen (2008:575) state that "*government regulations have been institutionalised by governments to combat issues that arise from the degradation of the environment*" and this links with the understanding of the participants' reasoning behind governments enforcing environmental concerns. From the findings it is evident that the participants believe that government should be doing more to drive green initiatives such as GSCM. This links with literature by Khiewnavawongsa and Schmidt (2013:226) who identified that a lack of government regulations has a negative impact on GSCM initiatives as it is a key driver of GSCM initiatives.

5.6.3 Key regulations that Affect GSCM Initiatives within the Pharmaceutical Industry

The most critical regulation that affects GSCM initiatives as identified by most participants (7) is 'Good Manufacturing Practices' (GMP). GMP is a set of procedures set by governing bodies for pharmaceutical companies to follow in all their operations to ensure that they uphold a set standard for their processes. The reasoning given by the participants is that the pharmaceutical industry is a critical industry and has no margin for error. If standards are not set, it can result in fatalities of consumers and the large scale destruction of the environment. One participant stated that government legislation was a key contributor to GSCM initiatives. Participant 1 remarked:

"If we look at GMP which we must follow as a company, it identifies ways for us to dispose of our waste materials. So it is already a requirement and there is a lot of ways that we can do GSCM. GMP is a critical piece of legislation because it governs us".

Participant 2 stated:

"GMP requires that you recycle and dispose of things properly anyways, so it's not a choice. It is supportive because you need regulations to guide you so you know what you are doing especially in a business like pharmaceutics".

It is evident that the "Good Manufacturing Practices" legislation has an impact on GSCM initiatives. This is in line with the observations by Kumar and Chandrakar (2012:5) and Lee and Klassen (2008:575) who observed that each industry has legislation that influences GSCM initiatives. Kumar and Chandrakar (2012:5) remark that legislation plays a role in a company's GSCM initiatives.

5.7 SECTION 4: GLOBAL FACTORS AND THEIR EFFECT ON GSCM AT CIPLA MEDPRO MANUFACTURING

The aim of this section was to determine whether external factors from the organisation affect GSCM initiatives. Factors such as water shortages, population growth and global warming are some of the factors that are dealt with in this section. Table 5.6 identifies the results from section 4.

Table 5.6: Global factors and their effect on GSCM at Cipla Medpro

Participant	Global factors affect GSCM initiatives at Cipla Medpro Manufacturing	Negative/positive effect	Any other factors that occur in South Africa that affect GSCM initiatives
Participant 1	Yes	Negative	No
Participant 2	Yes	Negative	No
Participant 3	Yes	Negative	No
Participant 4	Yes	Negative	No
Participant 5	Yes	Positive	Yes Unrest in the labour market
Participant 6	Yes	Negative	Yes Lack of awareness about green initiatives in South Africa
Participant 7	Not sure	Not sure	Yes Lack of Government encouragement on green initiatives
Participant 8	Yes	Negative	Yes Instability in the supply of electricity
Participant 9	Yes	Negative	Yes Poor supplier reliability

Source: Source: Compiled by researcher (2016)

Table 5.6 presents the results from the interviews – section 4 of the interview guide. Firstly, it identifies whether global factors such as overpopulation, food and water shortages, land use and climate change, affect GSCM at Cipla Medpro Manufacturing. Then it states what kind of effect it has on the company's GSCM initiatives and finally it states whether there are any other factors in South Africa that affect GSCM initiatives at Cipla Medpro Manufacturing.

5.7.1 Global Factors' Affecting GSCM Initiatives at Cipla Medpro Manufacturing

Out of all the participants a total of eight participants remarked that global factors have an impact on not only GSCM initiative but Cipla Medpro Manufacturing as a whole. One participant was not sure whether global factors affect GSCM initiatives at Cipla Medpro Manufacturing.

Seven out of the eight participants stated that, of all the global factors discussed, the global water crisis is identified as a critical factor. Recently, Cipla Medpro Manufacturing was affected by water cuts which caused the factory to stop operations. Chillers required for raw material storage, GMP requirements such as the washing of hands, water for production and waste material disposal (that is, sludging), all require the use of water. Therefore water shortages not only affect GSCM but the whole factory. Participant 2 remarked:

"It does affect all initiatives negatively at Cipla, definitely water, I can't say for the others but definitely water, because we can't run the factory without water. So it's critical and has a negative effect. There's high cost with water shortages, so it's very important".

Participant 9 provided an example:

"We recently had a problem with water which actually brought us to a standstill and makes us now work more harder, and now, to get back onto that role again, a smooth path is hard, so things like that, they call it nature, it does affect us".

Participant 1 remarked:

"Ok, honestly there's only one that directly affects us and the whole of CMM here, water shortages. It really literally causes a halt in the whole factory. So that is the only global factor I can say is a major negative impact. It causes us to go to a standstill without water, we need water for production. Besides water there's nothing else (factor) in South Africa or globally".

Participant 6 stated:

"The manufacturing plant uses over 6 000 litres of water a day to manufacture medication, so if there's no water the plant is going to stop".

Participant 3 agreed:

"Without water we can't do business and then we can't do green things, so it has a negative effect if we don't have water".

It is evident from the results and the statements by the employees that global factors, particularly water shortages, have a negative impact on GSCM initiatives at Cipla Medpro Manufacturing. It can be concluded, from the statements provided by the participants, that water shortages have a negative impact on GSCM initiatives and the company as a whole. Foley *et al.* (2005:570) concur and remark that water shortages will have a negative effect on all human activities.

5.7.2 Other Factors that Affect GSCM Initiatives at Cipla Medpro Manufacturing

Five participants identified factors that occur in South Africa that affect GSCM initiatives. Each participant identified a different factor. The factors are as follows:

5.7.2.1 Unrest in the Labour Market

Participant 5 noted:

"The labour markets and striking truck drivers. It's hard to implement consolidation. It probably will have a negative impact, as much as one is a positive for us the other is a negative for the environment. The cost saving on your transport will become a negative on your production, because you can't get your materials here, so you might save on your transport but you necessarily won't get it here on time."

From the statement above, it can be seen that one of Cipla Medpro Manufacturing's green initiatives, which is consolidation, is actually negatively affected by the labour unrest in South Africa.

5.7.2.2 Lack of Awareness about Green Initiatives in South Africa

Participant 6 remarked:

"I think more awareness would be beneficial, anything that impacts on the environment and ways that we can reduce that impact is beneficial to us, because at the end of the day we are manufacturing medication. We are advancing health care for all – that's the slogan for Cipla, so we don't only want to provide affordable medication to the public but we also want to balance the effect that it has on the external elements".

From this statement it is suggested that more awareness needs to be created within Cipla Medpro Manufacturing.

5.7.2.3 Lack of Government Encouragement on Green Initiatives

Participant 7 stated:

"There should be more encouragement from the governments' perspective, not just on managing plastic bags. There should be more regulation, there should be more research, there should be more encouragement financially, because everything that industry would look at is cost and benefit at the end of the day, so those things need to be encouraged at a higher level. If we can prove that we were doing x amount and now we are doing y amount there should be an encouragement for that, because those things do come at cost, so how do we encourage it to continuously improve on that".

From the response above given by participant 7 it can be deduced that government needs to play a bigger role in terms of green initiatives, and provide incentives for companies that incorporate green initiatives such as GSCM. Khiewnavawongsa and Schmidt (2013:226) note that a lack of government regulations has a negative impact on GSCM initiatives as government regulations are key drivers of GSCM initiatives. Lee and Klassen (2008:579) explain that Government regulations stimulate the incorporation of GSCM initiatives for small, medium and large businesses. Therefore a lack of government regulation will not provide enough incentives for companies to incorporate green initiatives such as GSCM and it will rely solely on a business' attitude to sustainability. Diabat and Govindan (2011:661) are of the opinion that businesses will not spend more than is necessary to maximise their economic goals, on environmental sustainability issues.

5.7.2.4 Instability in the Supply of Electricity

Participant 8 remarked:

"Instability of electricity supply will also have an adverse effect. It affects everything. I mean you know when the electricity goes out and the chillers go down. I don't know how long the factory will be in spec, but once the electricity comes back on the chillers will be restarted and the entire facility will have to check the temperature and humidity before production can recommence. It causes downtime which you never recover. I mean a lost 8 hour shift is a lost 8 hour shift. You generally don't recover that. The tendency is, as much as possible not to work overtime, not to work weekends. People need time off to rest and recover. By bringing people in on a Saturday or a Sunday they are traveling in their

own vehicle or public transport so there's more emissions that's being generated by people in on a Saturday or a Sunday".

This argument is further evidence that electricity shortages also have an adverse impact on Cipla Medpro Manufacturing and GSCM initiatives.

5.7.2.5 Poor Supplier Reliability

Participant 9 remarked:

"Our suppliers, sometimes it becomes difficult to get our materials from them. The supplier did some changes and moved to Joburg and we having problems with the bottles. Even raw materials come from overseas so we had a problem with that as well".

Therefore suppliers can also negatively affect GSCM initiatives at Cipla Medpro Manufacturing. This links with literature by Diabat and Govindan (2011:663), Walker and Brammer (2009:128) and Zhu *et al.* (2005:453) who remark that "suppliers have a considerable impact on GSCM initiatives and that suppliers could not facilitate for GSCM initiatives and thus become a barrier to the successful implementation and maintenance of GSCM initiatives".

5.8 SECTION 5: FACTORS AFFECTING CIPLA MEDPRO MANUFACTURING

This section focuses on determining what factors affect GSCM initiatives at Cipla Medpro Manufacturing. It also aims to determine how these factors affect Cipla Medpro Manufacturing's GSCM initiatives, be it positive or negative. Lastly, it aims to determine which factor, according to the participants, has the greatest effect on GSCM initiatives at Cipla Medpro Manufacturing. The results for section 5 are tabulated in table 5.7.

Table 5.7: Factors Affecting GSCM Initiatives at Cipla Medpro Manufacturing

	Factors		How factors affect Cipla*		
		Yes N=9	Positive	Negative	Greatest Factor
1.	Government Legislation	9	7	3	3
2.	Cost	9	7	5	3
3.	Organisation structure and strategy	8	7	1	1
4.	Management support and commitment	7	7	-	-
5.	Investment recovery	5	5	2	-
6.	Logistics	3	2	-	-
7.	Organisational learning	2	2	-	-
8.	Reverse logistics	1	1	-	1
9.	Competition	1	1	-	-
10.	Society	1	1	-	-
	Other Factors				
1.	Lack of manpower	1		1	-
2.	Lack of awareness	1		1	-

* The frequencies do not equal the number of participants (n) due to multiple responses being possible from each participant.

Source: Source: Compiled by researcher (2016)

5.8.1 Factors Affecting GSCM at Cipla Medpro Manufacturing

Table 5.7 lists the factors that affect the GSCM initiatives at Cipla Medpro Manufacturing, identified by the participants and whether these have a negative or positive effect on the participating company.

1. **Government Legislation**

As can be seen from table 5.7 all participants identified that government legislation has an effect on GSCM initiatives at Cipla Medpro Manufacturing. Most participants (7) are of the opinion that government legislation has a positive effect on GSCM, whilst three participants are of the opinion that it has a negative effect. One participant stated that it has both a positive and negative effect on GSCM. Participant 2 remarked:

"It has a positive impact because it forces all companies to implement green into their company. Cipla does a lot of green things but other companies aren't like that. So it's essential, I think".

Whilst participant 1 stated:

"It has a positive effect on us because it gives us guidelines to GSCM. Without it we would have to define our own ways to go green things like that".

Participant 7 remarked:

"Negative effect because of the lack of government encouragement and policy on green initiatives. Also the actual policing of those things, so whether we have the policy and the legislation in place, how do we police it effectively and ensure that people are actually following it. We should have professionals that are in those positions not just anybody, understand the policy and legislation and they must know each company's impact on it. They must be able to enforce those rules and regulations, not just having that on paper".

The above statements link with those by Khiewnavawongsa and Schmidt (2013:226); Diabat and Govindan (2011:661) and Kumar and Chandrakar (2012:5) who posit that government regulation has a considerable impact on GSCM initiatives. A lack of government regulations has a negative impact on GSCM initiatives, as it is a key driver of GSCM initiatives.

2. Cost

All the participants identified cost as a factor that affects GSCM initiatives at Cipla Medpro Manufacturing. According to the participants, cost can have either a positive or a negative effect on GSCM initiatives. Participant 3 stated:

"*It will affect prices, but I mean if it's expensive it will be negative. If it saves money it will be positive. So it can be either*".

Participant 9 remarked:

"*Yes, the company might implement it, if its cost is low. But if the cost is high, then they won't do it. So cost is very important*".

Participant 1 stated:

"*It is definitely a big positive factor, we save money so it drives us more towards green practices like GSCM. Without it, the only benefit would be saving the environment and it wouldn't be driven as much overall".*

These statements made by the participants coincide with those by Lee and Klassen (2008:191), Khiewnavawongsa and Schmidt (2013:3), Diabat and Govindan (2011:665) and Zhu *et al.* (2005:457) who are of the opinion that GSCM initiatives can increase or decrease a business' cost structure. Businesses can also reduce costs through reducing waste fees, government regulations costs and reduced energy consumption.

3. Organisation Structure and Strategy

Organisational structure and strategy was identified by eight participants as a factor affecting GSCM, with seven participants saying that it is positive and one participant stating that it is negative. Participant 1 remarked:

"*It does because we are always trying to improve green in the company like with Seans idea, it comes from management support so we focus on green where we can. So it is positive overall*".

Participant 9 remarked:

"*The structure will help us because you can communicate ideas to them*".

Participant 5 stated:

"*They do support it and it does have a positive effect overall. Cipla will implement GSCM initiatives*".

Participant 7 remarked:

"*Right now if we look at Cipla Durban organisational structure we have a SHERQ manager in place, so there is a focus on that perspective and Cipla South Africa, looks at basically EHS, Environment health and safety, from a very serious light and we don't joke about it, we are very serious about it. And it's not just seen as just we meet every month and we have stats being presented, we look at it from the point of view as, so what can we always do better and that is always recorded, as what are we going to look at next. So it has a positive effect on us*".

These responses correlate with those made by Zhu *et al.* (2005:462) and Lee and Klassen (2008:187) who observe that organisational structure and strategy can be a driver or barrier of GSCM initiatives. The overall organisational structure of organisations can also affect GSCM initiatives as it will determine whether GSCM initiatives are viable or not.

4. Management Support and Commitment

Management support and commitment was identified by seven participants as a factor affecting GSCM initiatives at Cipla Medpro Manufacturing. All these participants indicated that it has a positive effect on GSCM initiatives. Participant 5 remarked:

"*They are behind it, I think your saving on paper and costs falls into that category right, so that's one of the big drivers in the business is to cut down on those expenses and try and print double sided, for example, instead of printing single sheets and things like that, wherever we can. So it is positive*".

Whilst participant 3 stated:

"*I guess it does because the company always comes up with green things like recycling paper so they will affect it positively*".

These findings fit with the literature by Dhull and Narwal (2016:65), Kumar and Chandrakar (2012:4) and Diabat and Govindan (2011:661) who identify that the support of management is a critical factor in the adoption of new initiatives and is a key factor that affects GSCM initiatives. Consequently, the successful implementation of GSCM initiatives is reliant on management commitment.

5. **Investment Recovery**

Investment recovery is identified by five participants as a factor that affects GSCM. These participants identified it as a positive factor, one participant identified it as negative, whilst one participant identified it as both positive and negative factor. Participant 2 remarked:

"I guess it affects green positively especially here because it helps us save money like with reduced waste so we get more recovery of investment so it is positive".

Participant 1 stated:

"In our case I would say it has a positive effect because we get more for what we put in, like with using the bio-degradable board, we save money and we help the environment".

Whilst participant 7 remarked:

"For example, to increase our bay size will be beneficial because we can offload closer to the building and the hyster will require less movement and it uses a lot of diesel. But it will cost a lot and you can't see returns so it hasn't been implemented".

This findings are in line with those by Kumar and Chandrakar (2012:3), Narayana *et al.* (2014:380), Green *et al.* (2012:293) and Zhu *et al.* (2005:453) who remarked that investment recovery in a sustainability context refers to a business' strategic use, such as, recycling, reverse logistics, redeployment as well as similar techniques to gain greater value from its inputs such as materials and assets.

6. **Logistics**

Logistics was identified by three participants as a factor affecting GSCM initiatives at Cipla Medpro Manufacturing. Two participants identified it as a positive factor and one participant identified it as a negative factor. Participant 5 stated:

"I do a lot of consolidation on my loads, obviously it saves you money in terms of delivery, it will save you money".

Participant 8 remarked:

"Positive, because it saves us money, with consolidation, another benefit is, when we bring in one ton or four tons of material at the back door the guys have still got to re-palletise it, create the documentation to bring it in the system and the guys in the lab have got to come and sample it, they do military sampling, and then it goes for testing so you either bringing four loads a month, you sampling four times a month, the guys are testing four times a month to release the material or you bring in once a month, you going on the transport over a three week period, you going to save on the sampling time, you may need to sample more units because of the military sampling system but I do believe it does have a saving or a benefit to the company".

Participant 9 stated:

"GMP means that we can't mix up certain products, so we can't fill every truck, we also look at the truck size and capacity, they bring super-links and they do not fit in our loading bay. It has a negative effect".

The comments made by the participant link with the literature by Huynh (2013:5), Sellitto, Bittencourt and Reckziegel (2015:4) and Kumar and Chandrakar (2012:3) who are of the opinion that inbound and outbound logistics plays a key role on a company's carbon footprint. They also recognise that logistics is one of the most important downstream factors that affect GSCM initiatives because of its high carbon dioxide production.

7. Organisational Learning

Organisational learning was identified by two participants as a factor positively affecting GSCM initiatives.

Participant 5 said:

"It will help to have awareness, like if an independent sort of service provider came through and explained the whole thing, yeah that would be great I think the more awareness you create on that matter it will be for the better. Obviously you would get a lot of whispers here and there but someone actually running with it would actually benefit the business".

Participant 8 stated:

"I do believe that it would have a positive effect on GSCM, the way society is changing at the moment. I do believe that it is a good thing, if it had to be brought more into focus with the group, the business as a whole, I do believe that it would be accepted and people would participate in working towards greener supply chain management."

The statements by the participants regarding organisational structure and strategy link with the literature by Wood and Reynolds (2013:151), Dalkir (2005:26) and Kumar and Chandrakar (2012:3) who identify that GSCM initiatives benefit directly from organisational learning as they are people-intensive by nature and thus are dependent on tacit skill development. Skill development is developed through shared expertise gained through team efforts.

8. Reverse Logistics

One participant identified reverse logistics as a negative factor affecting GSCM at Cipla Medpeo Manufacturing. This participant remarked:

"*Overall it will save the company money because I mean you recycling material and getting refunded in a way because it will help the bottom line and the environment. But in this business it's negative, because the material can't be reused most of the time*".

This aligns with comments made by Narayana *et al.,* (2014:381), Jumadi and Zailani (2010:266) and Choudhary and Seth (2011:4986) who identify that reverse logistics is essential for processes such as recycling, refurbishing, reuse and remanufacturing, but it can have a negative effect in the pharmaceutical industry. This is because in the pharmaceutical industry one of the main environmental hazards is the waste from production and consumption, which is difficult to recycle and reuse.

9. Competition

Competition is identified by one participant as another positive factor affecting GSCM initiatives at Cipla Medpro Manufacturing. This participant remarked:

"All your competitors obviously practice GSCM, we don't know they might have a competitive advantage over us depending on how well they practice it and how much they practice it compared to us. Their pressure forces us to improve our GSCM practices".

This links with literature by Dhull and Narwal (2016:70) and Diabat and Govindan (2011:661) who posit that globally, a significant number of businesses focus on improving their environmental performance to gain an advantage over competitors.

10. Society

Society was identified by one participant as a positive factor affecting GSCM initiatives. According to the participant:

"Cipla provides medication to the public, to the society. For example, they require Odimune which is Anti Retro Viral tablet and there's a shortage here because there's a water shortage obviously people will start buying Odimune from another pharmaceutical manufacturer that won tender from the

government, like for example Aspen, and obviously that would reduce our sales and we'll lose out revenue for the month and that's how it impacts us. They would rather purchase their goods from someone that's more sustainably responsible".

This was also found in Darnall *et al.* (2008:34) and Van Rensburg (2015:11) who found that even though social responsibility drives GSCM initiatives, a business focus is on what is most important in their community.

5.8.2 Other Factors Affecting GSCM at Cipla Medpro Manufacturing

Two other factors were identified by the participants (see table 5.7) that were not listed as factors affecting GSCM initiatives in the interview guide. These two factors identified by one respondent each are: (1) lack of awareness and (2) lack of manpower.

1. **Lack of Awareness**

The participant who identified lack of awareness as a factor that negatively impacts on Cipla Medpro's GSCM initiatives said:

"I think awareness would be the most critical thing. Within the organisation I think they are, but remember we are not all working in an environment where we can sort of drive this thing, but getting people to come and drive it and sort of communicate it to everyone at the facility, I think that would give others that are not working in that particular environment more understanding and more sort of initiative to go with this concept".

2. **Lack of Manpower**

The participant who identified lack of manpower as a negative factor that impacts on Cipla Medpro's GSCM initiatives said:

"The other factor is time and the short hours we work, we run a 24 hour factory. We need more people. When the business expands it becomes more strenuous because we need more people but none are given to us. So we can't do too many initiatives".

5.8.3 Greatest Factors Affecting GSCM at Cipla Medpro Manufacturing

The aim of this section was to find out from the participants which identified factors in their opinion have the greatest effect on GSCM initiatives at Cipla Medpro Manufacturing. These greatest factors are presented in table 5.7 – last column. These factors are: (1) government legislation, (2) cost, (3) organisation structure and strategy, and (4) reverse logistics.

1. **Government Legislation**

With regard to government legislation participant 6 remarked:

"*Government legislation, I think that Medicine Control Council and Good Manufacturing Practices have the biggest effect on green supply chain management. Because they impose laws for you, they are the law, the MCC and the GMP is the law. So if they impose something on pharmaceutical industries that they must do something in a certain way which obviously promotes green supply chain management then we'll have to do it and in that way it is enforcing and you can't say no. It boosts your contribution towards green supply chain management. So MCC whatever they tell you, you just have to listen to them because they are the law, and GMP its good manufacturing practice*".

Whilst participant 2 stated:

"*I would say government legislation, because they are the law, so if they tell us that we have to do green over and above what we do. We must do it*".

2. **Cost**

With regard to cost, participant 1 remarked:

"Cost I would say, because it affects us positively now because we finding ways to save costs and go green but some areas have cost implications. So that is a big negative barrier even at Cipla. We can't just invest money into going green because it is not easy to do that. We are still a company and we do focus on green but we also need to keep the company running".

Participant 4 stated:

"Cost is the major implication; there is high cost that's associated with GSCM. To change systems is expensive as well. So you think about, you got somebody who lives in a location a rural area who can't even afford to buy himself a meal for that evening and he needs to take some medication. Is it fair if we go in at triple the price or should we try and sell it to him at the lowest price possible and make it affordable for him to have medication, which one should it be? Should he be worried about the environment or saving his life?"

3. **Organisation Structure and Strategy**

With regard to organisational strategy and structure participant 7 remarked:

"First of all it is our people's mind-set and then if you add that to our philosophy of none shall be denied – when it comes to medication we have to continuously look at innovative ways at bringing down costs so that we can deliver medication to people at a much lower cost all the time. Innovation in that

field will help. It affects everything positively because it becomes a second nature to save and reduce waste".

4. **Reverse Logistics**

Finally, with regard to reverse logistics participant 3 stated:

"I would say reverse logistics because I mean we outsource it because we can't make savings most of the time. The raw materials are sludged because most of the time we can't reuse them because of GMP and then the same goes for packaging material, we have to shred most of it. If we could reuse it would be helpful and we could protect the environment but we can't, so it's a loss".

5.9 SECTION 6 - WHAT PROCEDURES DOES CIPLA MEDPRO MANUFACTURING HAVE IN PLACE TO OVERCOME THE FACTORS THAT NEGATIVELY AFFECT GSCM INITIATIVES

The aim of this section was to determine whether Cipla Medpro Manufacturing has any procedures in place to overcome the factors that negatively affect GSCM initiatives. The purpose of this section overall was to determine if Cipla Medpro Manufacturing have already developed a strategy to overcome the negative factors or not. Table 5.8 identifies the results that have been collected from the interview on section 6.

Table 5.8: Remedies to Overcome the Factors that Negatively Affect GSCM Initiatives

Participant	Cipla has procedures in place to overcome the negative factors that negatively affect GSCM initiatives	Do these procedures successfully overcome these negative factors?
Participant 1	Not sure	Not sure
Participant 2	Improving consolidation Reverse logistics	Yes
Participant 3	Not sure	Not sure
Participant 4	Reduction of cost	Not sure
Participant 5	Not sure	Not sure
Participant 6	Reduction of cost	Yes
Participant 7	Policies and procedures as drivers of GSCM	Not sure
Participant 8	Backup Generator External water suppliers	Not sure
Participant 9	No	No

Source: Source: Compiled by researcher (2016)

From the results gathered from the participants, only five participants stated that Cipla Medpro Manufacturing has procedures in place to overcome the negative factors that affect GSCM initiatives, whilst one participant stated that they do not have procedures in place to combat the negative factors and three participants stated that they are unsure. Participant 5 said:

"I'm not sure though, I must be honest, if there are any other plans and things in place, I know the paper issue has been dealt with, it's been brought to our attention, and other common sort of issues within the business but, no".

Participant 9, when asked if Cipla Medpro Manufacturing has procedures in place to overcome the negative factors, remarked:

"Not that I can see".

Participant 3 replied:

"No, I don't think we have any in place, as far as I know".

Participant 7 remarked:

"Definitely, our policies and procedures are great drivers of consciousness when it comes to those things and doing it right always, and it is self-policed. Not right now I think whatever we've talked about, we've rolled out, but it doesn't stop us from thinking more, just that currently our focus is a bit different".

Whilst participant 6 stated:

"Yes, definitely because as a buyer in the procurement department my objective is always to look for alternate vendors who are cheaper and who are of the same quality of the materials so we can also mitigate that cost factor by looking for suppliers that can mitigate that cost factor and provide that same grade of materials, also by buying in bulk quantities we can reduce cost, so cost is not a problem in that area. And also by negotiating with suppliers on a monthly basis to get best price out of them, without reducing the quality of the product".

From the results it can be concluded that the participants of this study are not sure whether Cipla Medpro Manufacturing has procedures in place to overcome the negative factors that affect GSCM initiatives. That does not mean that the company does not have any in place, but perhaps that the participants are not aware of them.

- **Suggestions by participants on remedies to negative GSCM factors**

Four of the participants made some suggestions on how the negative factors affecting GSCM could be overcome. Some of these include:

"I would suggest companies that do practice them in detail, come through and explain to us in detail, or to do a slide show to discuss more about it, so we are more aware of it and we can decide how we can practice it. So like a presentation of green supply chain management".

"I will say to, instead of buying from suppliers that are in Johannesburg and Cape Town, we can buy more from suppliers that are in Durban. In this case it will reduce the logistics cost big time. Secondly, in manufacturing they can obviously increase batch sizes for each product which will obviously, more output for a unit can be produced and can be sold. Batch sizes to increase".

"I would say improving consolidation, because it's a good way to reduce costs and save the environment. But reverse logistics is also important, ok we do it through with oracle and they comply with GMP, but maybe we can save more doing it ourselves, but I'm not sure because it will be expensive".

"Yes, we can reduce overheads, you remember when you worked here, we do not need so many managerial staff. We need more workers. If we can save the money by reducing staff then we can use them elsewhere like GSCM".

"I have an idea for green, it's to integrate planning and procurement, so we can have less waste and more full loads. So we'll have less deliveries and less waste material like if something is getting old because it's going out of circulation like a change with packaging".

The ideas put forth by the participants, could be introduced to overcome some of the negative factors affecting GSCM initiatives at Cipla Medpro Manufacturing.

5.10 CONCLUSION

This chapter presented the data analysis. The chapter commenced by revisiting the research objectives of this study, indicating which objectives have been achieved in this chapter.

Firstly, section 1 presented the profile of the participants. Then, section 2 identified GSCM initiatives at Cipla Medpro Manufacturing, some of the identified GSCM initiatives are consolidation of loads, green procurement, waste reduction and recycling.

Section 3, identified if the pharmaceutical industry was suitable for GSCM initiatives. Most of the participants identified that the pharmaceutical industry is in a favourable position to implement GSCM initiatives due to regulations such as GMP.

Next, section 4 identified if global factors affect GSCM initiatives at Cipla Medpro Manufacturing, a key global factor that was identified is the shortage of water and its impact on the Cipla Medpro Manufacturing. Local factors affecting GSCM initiatives were also identified, some of these factors include the labour unrest and the unstable electricity supply.

Section 5 identified which factors affect GSCM initiatives at Cipla Medpro Manufacturing. In this section there were twelve factors identified. The four most common factors that were identified were government legislation, cost, organisational structure and strategy, and management support and commitment. Whilst government legislation, cost, organisational structure and strategy, and reverse logistics were identified as critical factors that had the most impact on GSCM initiatives at Cipla Medpro Manufacturing.

Lastly, section 6 identified whether Cipla Medpro Manufacturing has remedies in place to overcome the negative factors affecting GSCM. Some of the mentioned remedies are improving consolidation, reverse logistics, reduction of cost and policies and procedures as drivers of GSCM. Thereafter the participants gave their ideas on the other remedies that the company could employ such as reducing overheads and improving local sourcing.

The next chapter, chapter 6 concludes this study by summarising the main findings and providing appropriate recommendations. Each objective will be revisited to draw conclusions and make recommendations.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

In the previous chapters aspects such as the problem statement, research objectives, literature review, research methodology and the presentation and analysis of the data are presented and discussed. This chapter concludes the study and provides an overall summary of the study and its results. Each objective is considered through the summarising of literature and the empirical data, drawing conclusions and making recommendations. This chapter then concludes with the identification of the limitations of the study and recommendations for future research.

6.2 OVERVIEW OF THE CHAPTERS

This section presents a brief description and key elements of each chapter.

Chapter 1: Introduction and Background to the Study

Chapter one provides the background of the study, it identifies the importance of the study, identifies global companies that undertake GSCM initiatives. The scope of the study is then identified, followed by the objectives of the study and the research questions. Figure 1.1 then identifies the research process that the researcher followed in the study.

Chapter 2: GSCM

Chapter two identifies literature that gives structure to the study. It includes an overview of SCM its purpose in businesses and the various departments that comprises SCM. This is then linked to sustainability and GSCM. The factors affecting GSCM are presented in tables 2.5 and 2.6. These factors were derived from literature by various authors. From the review of the literature, questions were formulated to address and achieve each research objective - this is tabulated in table 2.7.

Chapter 3: The Pharmaceutical Industry

Chapter three focuses on the national and global pharmaceutical industry and identifies the green initiatives that companies within this industry have implemented. Global factors that occur due to climate change and the environment are then discussed to explain why sustainability is important within the pharmaceutical industry. Pharmaceutical chains are then discussed to identify how they operate followed by the factors affecting the GSCM initiatives that pharmaceutical companies incorporate. Identified GSCM initiatives are tabulated in table 3.4. The literature in this section is then used to formulate questions that were used to address and achieve the objectives of the study – this is tabulated in table 3.7.

Chapter 4: Research Methodology

Chapter four focuses on the methodology that the researcher used in the study to answer the research questions and achieve the objectives. The research approaches and techniques, target population, sampling technique used, data collection and data analysis methods are all dealt with appropriately. The pretesting process and interview process is also explained. This chapter provides insight into, and concludes with, the methods used to ensure that data quality and an explanation of the data quality technique used in the research.

Chapter 5: Analysis and Discussion of the Data

This chapter begins with the revision of the research objectives of the study and links it with the secondary data and empirical data collected – this is presented in table 5.1. This chapter then goes on to identify the data collected by the participants and tabulates data in tables 5.4 to 5.8. After each table the data is discussed and is linked back to the literature review. Direct quotes from the participants are also used to ensure data quality under each section.

6.3 REFLECTION ON EACH OBJECTIVE - : CONCLUSION AND RECOMMENDATIONS

This section will begin with a recap of the research objectives and then moves on to the conclusions and recommendations.

6.3.1 Research Objectives

In order to answer the research questions, the research objectives of this study are outlined as follows:

1. To provide insight into the GSCM initiatives in the planning, procurement and logistics departments at Cipla Medpro.
2. To identify the factors affecting GSCM initiatives in the planning, procurement and logistics departments at Cipla Medpro.
3. To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on GSCM in the planning, procurement, logistics departments.
4. If Cipla Medpro has such procedures in place, to provide insights into the procedures.

6.3.2 Objective 1: To Provide Insight into the GSCM Initiatives in the Planning, Procurement and Logistics Departments at Cipla Medpro

The various GSCM initiatives at Cipla Medpro Manufacturing have been identified and explained in detail by the participants. It is evident that Cipla Medpro Manufacturing have GSCM initiatives, some of the initiatives identified are: the consolidation of deliveries to reduce carbon emission and utilisation of vehicles; procurement of virgin materials that are biodegradable; recycle bins on site and recycling of waste; procurement from local suppliers; ISO14001 suppliers and green purchasing; capacity planning; the reduction of waste; and reducing the amount of colour on labels and cartons..

- **Consolidation of deliveries to reduce carbon emission and utilisation of vehicles**

The consolidation of loads is the maximisation of transport loads to ensure that there are fewer loads to and from Cipla Medpro Manufacturing. This reduces the amount of transport used and the carbon emissions that are accompanied by more loads.

- **Procurement of virgin materials that are biodegradable**

This is the purchasing of materials that are bio-degradable, meaning that these materials will degrade easily into the environment. The use of bio-degradable materials ensures that if the packaging materials end up in a landfill site then they can easily degrade and have little or no impact on the environment.

- **Recycle bins on site and recycling of waste**

The use of recycle bins and recycling waste is to reuse all materials that can be recycled and thus preventing that material from being thrown in a landfill site. The recycle bins are placed in easily accessible areas such as the cafeteria to promote recycling.

- **Procure from local suppliers**

The procurement of materials from local suppliers is encouraged as this reduces the distance of travel and thus transportation methods that are less destructive to the environment. By using local suppliers the carbon emissions are lower than when using foreign suppliers as transportation distance is reduced.

- **ISO14001 suppliers and green purchasing**

Procuring from suppliers that are ISO 14001 certified ensures that the supplier is environmentally responsible, meaning that they use materials from a sustainable source and that they act in a way that is environmentally responsible. The International Organisation for Standardisation sets these standards.

- **Capacity planning**

Capacity planning ensures that Cipla Medpro Manufacturing optimises their storage and transport capacity. The use of capacity planning facilitates for the use of another GSCM initiative known as consolidation. Capacity planning ensures that Cipla Medpro Manufacturing is always efficient in terms of transport and storage.

- **Reduction of Waste**

The goal at Cipla Medpro Manufacturing is to reduce overall waste through reducing changeovers, electricity usage, water usage and chemical usage. Different techniques are used such as improving awareness through charts in different departments that depict the cost aligned with wastage.

The participants have also identified that this GSCM initiative has a positive impact on the company. The benefits of GSCM, according to the participants, are helping the environment, Cipla Medpro Manufacturing's public image and a reduction in costs.

- **Reducing amount of colour on labels and cartons**

Cipla Medpro Manufacturing has reduced the amount of colours on their cartons. This has reduced the emissions and wastage created by the use of multiple colours. It also reduces the amount of solvent or vapour that is given off by dyes into the environment.

The pharmaceutical industry was identified as being in a favourable position for GSCM initiatives because of the legislation known as "Good Manufacturing Practices" that enforces GSCM within companies within the pharmaceutical industry.

It was also identified that GSCM initiatives are set by both Cipla Medpro Manufacturing and Cipla International. Therefore Cipla Medpro Manufacturing has to incorporate some GSCM initiatives that Cipla International is involved with but they are also given the authority to incorporate their own GSCM initiatives.

Recommendations

Going forward it is suggested that Cipla Medpro Manufacturing focuses on incorporating GSCM initiatives so as to reduce their overall costs and improve their public image. Since it has been identified that the pharmaceutical industry is in a favourable position to incorporate GSCM because of the current legislation, Cipla Medpro Manufacturing can use this to build a more sustainable supply chain at minimal cost.

6.3.3 Objective 2: To Identify the Factors Affecting GSCM Initiatives in the Planning, Procurement and Logistics Departments at Cipla Medpro

The study identified that there are various factors that affect GSCM initiatives at Cipla Medpro Manufacturing. These are global and local factors. A key global factor identified by participants is the shortage of water. Factors in South Africa were labour unrest, lack of awareness on GSCM initiatives, lack of government encouragement on GSCM, instability of the electricity supply and poor supplier reliability. Legislation set by the government is identified as a positive driver by most of the participants.

The factors affecting GSCM initiatives include: government legislation, cost, organisation structure and strategy, management support and commitment, investment recovery, logistics, organisational learning, reverse logistics, competition, society, lack of manpower, and lack of awareness. The factors perceived by participants that have the greatest effect on GSCM are: government legislation, cost, organisational structure and strategy, and reverse logistics.

- **Government legislation**

Government legislation presents the regulations and rules set forth by the government sector to govern the pharmaceutical industry. These are set to ensure that there is a set standard in the pharmaceutical industry.

- **Cost**

This is the cost factor that is aligned with the implementation of GSCM initiatives. Each GSCM factor has a cost implication attached with it as well as a possible saving. The cost of GSCM initiatives filter down to the overall cost price of Cipla Medpro Manufacturing's products.

- **Organisation structure and strategy**

This is the structure and strategy that the organisation has incorporated to achieve their goals. The structure and strategy can influence or deter the implementation of GSCM initiatives within a company. If the structure and strategy supports GSCM initiatives then it will influence the employees to focus on GSCM initiatives but if it does not then it will not be an area of focus and thus become a barrier.

- **Management Support and Commitment**

This is the support and commitment that a company and its management give to the adoption and maintenance of GSCM initiatives. If management supports and is committed to GSCM initiatives it will further drive these initiatives. It can also be a barrier if there is no support and commitment by top management as employees will not feel that is an area of focus.

- **Investment recovery**

This is the total benefit that is generated by GSCM initiatives for the company. The returns on investment can affect GSCM initiatives as it will determine if it is feasible for a company to incorporate these GSCM initiatives. Initiatives can bring in additional benefit or have a purely negative effect on the bottom line.

- **Logistics**

This is the transportation and storage that is involved with GSCM initiatives and can be used as a GSCM initiative, for example, with consolidation. Logistics costs can vary between the use of alternate transport or the cost of transporting and storing green materials.

- **Organisational learning**

This is the knowledge of the company on GSCM initiatives and the capabilities of its staff to incorporate these initiatives. The knowledge of the staff to incorporate GSCM initiatives is important to the implementation of GSCM initiatives as it will influence and determine if the initiative will be successful or not.

- **Reverse logistics**

This is the backward movement of goods and waste from the end user to the company, certain green initiatives such as recycling and disposal of harmful goods depend on reverse logistics and its efficiency within a company.

- **Competition**

This is the effect of competitors to influence a company's GSCM initiatives or the implementation of GSCM initiatives. Competitors can influence prices that can make GSCM initiatives difficult to implement or use GSCM initiatives as tools to gain the competitive advantage.

- **Society**

Society can pressure companies to implement GSCM initiatives and can have a direct effect on a company's adoption of GSCM initiatives. If the focus of society is not on GSCM initiatives then companies may also not place focus on them.

- **Lack of awareness**

This is a new factor identified by participants in the study. According to the participants, a lack of awareness is a company's lack of awareness of the importance of sustainability and GSCM. This has been identified as a purely negative factor.

- **Lack of manpower**

This is also a new factor identified by participants in the study. This is the lack of manpower or employees required to successfully implement and maintain GSCM initiatives. This has been identified as a negative factor.

- **Global Factors: Water shortages**

Water shortages have been identified as a key global negative factor affecting GSCM initiatives at Cipla Medpro Manufacturing. This is because Cipla Medpro Manufacturing is not able to function without a steady water supply and as a result GSCM initiatives cannot operate.

Table 6.1 identifies the factors that the participants have stated to have the greatest perceived effect. Table 6.1 lists each key factor with the number of participants that have identified each factor.

Table 6.1: Factors Perceived to have the Greatest Effect

Factors with the greatest perceived effect	Number of participants stating that the factor is indeed a critical factor
Cost	4
Government Legislation	3
Reverse logistics	1
Organisational structure and strategy	1

Source: Compiled by researcher (2016)

From table 6.1 the four factors with the greatest perceived effect have been identified. By identifying the key factors affecting GSCM initiatives, Cipla Medpro Manufacturing can now focus on these key factors. This also gives more direction into areas of future research into key factors and places greater focus on key areas.

Recommendations

It is recommended that Cipla Medpro Manufacturing focuses on the factors with the greatest perceived effect, namely, government legislation, cost, organisational structure and strategy, and reverse logistics. By minimising the negative factors and promoting the drivers from the factors with the greatest perceived effect, it is suggested that Cipla Medpro Manufacturing can optimise their GSCM initiatives. In addition, it is also suggested that by reviewing the factors identified, Cipla Medpro Manufacturing can work on counter measures to overcome the negative factors affecting GSCM. It is recommended that Cipla Medpro Manufacturing incorporate overhead reduction costs as suggested by staff members. This can be achieved by revisiting their cost structure and eliminating any excess costs. It is further recommended that Cipla Medpro Manufacturing make their GSCM initiative presence better known to staff members. This could be achieved through meetings and emails – which may assist innovation by staff members.

6.3.4. Objective 3: To Find out Whether Cipla Medpro has Procedures in Place to Overcome the Factors that Negatively Impact on Green Supply Chain Management in the Planning, Procurement and Logistics Departments

Objective 4: If Cipla Medpro has such procedures in place, to provide insight into the various procedures they have in place. The procedures in place by Cipla Medpro Manufacturing, according to the participants, is improving of consolidation, reverse logistics, reduction of costs, policies and procedures in place to act as drivers of GSCM, backup generators and external water suppliers. Most of the participants were unsure whether these procedures effectively overcame the negative factors affecting GSCM initiatives at Cipla Medpro Manufacturing.

- **Improving consolidation**

Improving consolidation is the improvement of consolidation by incorporating better alignment of planning, purchasing and logistics. This helps to reduce costs overall, according to the participants.

- **Reduction of cost**

Costs can be reduced through the purchasing of lower prices green materials and the continuous process of searching for cheaper suppliers. This helps the company cut costs and thus focus the savings on GSCM.

- **Policies and procedures as drivers of GSCM**

Cipla Medpro Manufacturing has policies and procedures in place that focus on reducing waste and promoting sustainability. This is seen as a driver of GSCM initiatives.

- **Backup generator**

The use of a backup generator assists with keeping the factory running even when there are electricity shortages. This allows for the factory to keep running and the smooth operation of GSCM initiatives.

- **Reverse logistics**

The reverse logistics department is outsourced so Cipla Medpro Manufacturing saves money and facilitates for experts to dispose of their dangerous waste by-products. This ensures that it is also properly disposed of.

- **External water suppliers**

External water suppliers are used to make sure that the facility can operate even during water shortages. This ensures that the operations of Cipla Medpro Manufacturing are always operating and GSCM initiatives can be carried out.

The suggestions put forth by the participants included: training of staff at Cipla Medpro Manufacturing to efficiently initiate GSCM initiatives, reduce overheads, integrate planning and procurement, and to improve awareness.

- **Reduce overheads**

This suggestion was to reduce the overall overhead costs and to use the savings on GSCM initiatives. This pertained to the reduction of managerial staff and extra managerial roles that one participant felt superfluous.

- **Integrate planning and procurement**

It was suggested by participants that planning and procurement should be better integrated in order to reduce waste and excess material and to improve efficiency. This would assist the company by saving money and reinvesting it in other GSCM initiatives.

- **Improve awareness**

Participants suggested that a third party company or expert in the field of GSCM be used to better inform and bring more awareness towards sustainability and GSCM. The use of a slide show or presentation to emphasise the importance of GSCM was also identified.

Recommendations

It is recommended that Cipla Medpro Manufacturing make use of the input and suggestions made by participants and also determine whether these are viable options for counter measures against negative factors affecting GSCM. Since it was found that Cipla Medpro Manufacturing staff would like more exposure to GSCM through training by experts, it is suggested that the company provide this training. Training could be provided to supply chain staff on GSCM, particularlyto non-managerial staff as they are the least knowledgeable on GSCM. Cipla Medpro Manufacturing could use third party environmental management training companies to educate staff on GSCM. There also needs to be improved communication between top management and SCM staff and between the planning and procurement department to improve efficiency. This could be achieved by creating cross functional teams to ensure that departments are intergrated.

6.4 SUMMARY OF THE FINDINGS, RECOMMENDATIONS AND BENEFITS

Table 6.2 summarises the findings of the study. The GSCM initiatives, factors affecting GSCM initiatives and the procedures to overcome the negative factors affecting GSCM have been identified by the participants and tabulated.

Table 6.2: Summary of the GSCM Initiatives, Factors Affecting GSCM Initiatives and Procedures to Overcome the Negative Factors at Cipla Medpro Manufacturing

GSCM initiatives at Cipla Medpro Manufacturing	Factors affecting GSCM initiatives at Cipla Medpro Manufacturing	Procedures in place to overcome the negative factors affecting GSCM at Cipla Medpro Manufacturing
• Recycle bins on site and recycling of waste • Consolidate deliveries to reduce carbon emission and utilisation of vehicles. • Procurement of virgin materials that are biodegradable • Procure from local suppliers • ISO14001 suppliers and green purchasing • Capacity planning • Reduce waste • Reducing amount of colour on labels and cartons	• Government Legislation • Cost • Organisation structure and strategy • Management support and commitment • Investment recovery • Logistics • Organisational learning • Reverse logistics • Competition • Society • Lack of awareness • Lack of manpower • Global factors: Water shortages	• Reduce overheads • External water suppliers • Reverse logistics • Backup Generator • Policies and procedures as drivers of GSCM • Reduction of cost • Improving consolidation

Source: Compiled by researcher (2016)

In a nutshell, table 6.2 identifies the findings of the empirical study at Cipla Medpro Manufacturing. Firstly, table 6.2 identifies all the GSCM initiatives that Cipla Medpro Manufacturing is involved in as identified by the participants. It also identifies all the factors that the participants have identified as contributing aspects towards GSCM initiatives at Cipla Medpro Manufacturing. Finally, the procedures that Cipla Medpro Manufacturing has in place to overcome the negative factors affecting GSCM initiatives are listed in the final column. This could benefit Cipla Medpro Manufacturing by identifying the factors affecting their GSCM initiatives and possible solutions which would result in improved effciency and effectiveness of their GSCM initiatives.

6.5 LIMITATIONS OF THE STUDY

This study provides insight into the factors affecting GSCM initiatives at Cipla Medpro Manufacturing. However, the study is not without its limitations. These are as follows:

- The results cannot be generalised to other companies in the pharmaceutical industry as the results are unique to Cipla Medpro Manufacturing.
- The results on the factors affecting GSCM are limited to three departments within Cipla Medpro Manufacturing South Africa, therefore it does not give the holistic view of the entire organisation.

- The results cannot be generalised to Cipla International as a whole and only Cipla Medpro Manufacturing. The reason being that the aim of this study focused on on GSCM initiatives at Cipla Medpro Manufacturing only.

6.6 FUTURE RESEARCH DIRECTIONS

The aim of this study was to identify the factors that affect GSCM initiatives at Cipla Medpro Manufacturing. In order to achieve this, an in-depth understanding of the factors and a literature research was undertaken. In order to gather the empirical data, semi-structured interviews were conducted with nine participants at Cipla Medpro. Possible areas for future research include:

- Determining whether factors affecting GSCM initiatives vary between companies, hence future research could focus on resolving these negative factors or improving drivers of GSCM.
- The study was specific to Cipla Medpro Manufacturing, however, future research could focus on identifying whether the factors identified are unique to Cipla Medpro Manufacturing or prevalent throughout the pharmaceutical industry.
- It is also suggested that a future study could include all the departments at Cipla Medpro Manufacturing to determine whether they encounter similar barriers to green initiatives.
- Studies into other Cipla branches could also be conducted to determine whether these factors are specific to Cipla Medpro Manufacturing or to Cipla as a whole.
- Further research into the critical factors affecting GSCM initiatives are also suggested as this can create insights into methods to overcome these negative factors.

6.6 CONCLUSION

The study identified the GSCM initiatives at Cipla Medpro Manufacturing, the factors affecting GSCM initiatives at Cipla Medpro Manufacturing and the techniques used by Cipla Medpro Manufacturing to overcome the negative factors affecting GSCM initiatives. In order to achieve the objectives of this study, semi-structured interviews were conducted. The questions were formulated from an in-depth literature review that also provided insights into the topic. The literature review focused on two key areas that pertain to the study, namely, SCM and the pharmaceutical industry. This was then split into two chapters: chapters 2 and 3, and discussed the various factors affecting GSCM in the pharmaceutical industry and other essential information that laid the foundation for the study.

The study is qualitative and employed face-to-face semi-structured in-depth interviews to gather empirical data. This data was analysed and results tabulated and presented. The findings identified various factors affecting GSCM initiatives at Cipla Medpro Manufacturing and methods used by the

company to overcome these negative factors. Critical factors were also identified and explained to better overcome these factors. From the results of the study, recommendations were made.

Through this study the GSCM initiatives that Cipla Medpro Manufacturing have in place have been identified, the factors affecting GSCM initiatives at Cipla Medpro Manufacturing have also been identified as well as the procedures that have been put in place to overcome these negative factors. The study has laid the foundation to better improve these procedures, overcome the negative barriers and gain a better insight into GSCM initiatives at Cipla Medpro Manufacturing.

7. REFERENCE LIST

Alfonsi, K, Colberg, J, Dunn, PJ, Fevig, T, Jennings, S, Johnson, TA, Kleine, HP, Knight, C, Nagy, MA, Perry, DA and Stefaniak, M 2008, Green chemistry tools to influence a medicinal chemistry and research chemistry based organisation. Green Chemistry, 10(1), pp.31-36.

Anderson, DL, Britt, FF & Favre DJ 2010, *The Best of Supply of Supply Chain Management Review: The Seven Principles of Supply Chain Management*, Viewed 17 April 2016, <www.scmr.com/images/01.SevenPrinciples_.pdf>

Andreasen, P. H. (2012) *'The Dynamics of Procurement Management- A Complexity Approach'*, LIMAC PhD School,16-76.

Angell, M 2004, Excess in the pharmaceutical industry. *Canadian Medical Association Journal*, 171(12), pp.1451-1453.

Appolloni, A, Sun, H, Jia, F & Li, X 2014, Green Procurement in the private sector: a state of the art review between 1996 and 2013, *Journal of Cleaner Production*, 85, pp.122-133.

Attar, M, Gilaninia & Homayounfar, M 2016, A study of the effect of green supply chain management's components on the performance of the pharmaceutical distribution companies system in iran, *Arabian Journal of Business and Management Review (Oman Chapter)*, 5(8), p.48.

Ayers, RU & Ayers, LW 2002, *A Handbook of Industrial Ecology*, Edward Elgar Publishing Limited, 3-4, France.

Bag, S 2013, Designing the Green Supply Chain Strategy for Indian Manufacturing Firm, *Journal of Supply Chain Management Systems,* 2(1), p.8.

Baumgärtner, S & Quaas, M 2010, *What is sustainability economics*?, Ecological Economics, 69(3), pp.445-450, Germany.

Beri, GC 2013, *Market Research, Sampling Processes and Design*, McGraw-Hill Education, 197, India.

Bloch, A 2011, '*Procurement Maturity: A tool for Supply Chain improvement'*, MBA thesis, KTH School of Industrial Engineering and Management, Stockholm.

Bölte, S 2014, *The power of words: Is qualitative research as important as quantitative research in the study of autism*?, Autism, 18(2), pp.67-68, United Kingdom.

Boltic, Z, Ruzic, N, Jovanovic, M, Savic, M, Jovanovic, J & Petrovic, S 2013, Cleaner production aspects of tablet coating process in pharmaceutical industry: problem of VOCs emission, *Journal of Cleaner Production*, 44, pp.123-132.

Bond, P 1999, Globalization, pharmaceutical pricing, and South African health policy: managing confrontation with US firms and politicians, *International Journal of Health Services*, 29(4), pp.765-792.

Bougie, R & Sekaran, U 2013, *Research Methods for Business*, John Wiley & Sons Ltd, 6, 16-194, USA.

Brandenburg, M, Govindan, K, Sarkis, J & Seuring, S 2014, Quantitative models for sustainable supply chain management: Developments and directions*, European Journal of Operational Research*, 233(2), pp.299-312.

Brantlinger, E, Jimenez, R, Klingner, J, Pugach, M & Richardson, V 2005, Qualitative studies in special education, *Exceptional children*, 71(2), pp.195-207, Michigan.

Broek, F 2010*, Green Supply Chain Management, Marketing tool or revolution?,* Inaugural speech related to lectureship Logistics and Sustainability, Netherlands, NHTV Breda University of Applied sciences, 1-40.

Carroll, AB 1999, Corporate social responsibility evolution of a definitional construct, *Business & society,* 38(3), pp.268-295, University of Georgia.

Chien, MK & Shih, LH 2007, An empirical study of the implementation of green supply chain management practices in the electrical and electronic industry and their relation to organizational performances. *International Journal of Environmental Science and Technology*:(IJEST), 4(3), p.383.

Choudhary, M & Seth, N 2011, Integration of green practices in supply chain environment-The practices of inbound, operational, outbound and reverse logistics, *International Journal of Engineering Science and Technology*, 3(6), pp.4995-4993.

Christopher, M 2005, *Logistics and supply chain management: creating value-added networks*, Pearson education, United Kingdom.

Chunguang, Q, Xiaojuan, C, Kexi, W & Pan, P 2008, *Research on green logistics and sustainable development*, In 2008 International Conference on Information Management, Innovation Management and Industrial Engineering (Vol. 3, pp. 162-165), IEEE.

Cipla 2016, *Bringing world class, flexible, contract manufacturing solutions to South Africa*, Viewed 07 March 2016 <http://www.cipla.co.za/manufacturing.>

Collins, D 2003, Pretesting survey instruments: an overview of cognitive methods, *Quality of life research*, 12(3), pp.229-238, London.

Council of Supply Chain Management Professionals 2016, *CSCMP Supply Chain Management Definitions and Glossary*, Viewed 18 April 2016, <https://cscmp.org/supply-chain-management-definitions>

Croxton, KL, Garcia-Dastugue, SJ, Lambert, DM & Rogers, DS 2001, The Supply Chain Management Processes, *The International Journal of Logistics Management*, 13-36.

Crum, M, Poist, R, Carter, CR & Easton, PL 2011, Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, 41, 46-62.

Dalkir, K 2005, *Knowledge management in theory and practice*. Elsevier Inc, United Kingdom.

Darnall, N, Jolley, GJ & Handfield, R 2008, Environmental management systems and green supply chain management: complements for sustainability?, *Business Strategy and the Environment*, 17(1), pp.30-45, Arizona.

Dashore, K & Sohani, N 2013, Green Supply Chain Management – Barriers & Drivers: A Review, *International Journal of Engineering Research & Technology*, 2, 2021-2030.

Deloitte, 2015, *2015 Global life sciences outlook: Adapting in an era of transformation*, Viewed 08 August 2016, <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-2015-life-sciences-report.pdf>

Demir, E, Bektaş, T & Laporte, G 2014, A review of recent research on green road freight transportation, *European Journal of Operational Research*,237(3), pp.775-793.

Dezzani, L 2016, Top 10 Pharmaceutical Companies 2016, Viewed 09 August 2016, <https://igeahub.com/2016/05/06/top-10-pharmaceutical-companies-2016/>

Dhull, S & Narwal, M 2016, *Drivers and barriers in green supply chain management adaptation: A state-of-art review*, Uncertain Supply Chain Management, 4(1), pp.61-76, Sonipat, India.

Diabat, A & Govindan, K 2011, An analysis of the drivers affecting the implementation of green supply chain management, *Resources, Conservation and Recycling*, 55(6), pp.659-667, United Kingdom.

Dukes, MG 2002, Accountability of the pharmaceutical industry, *The Lancet*, 360(9346), pp.1682-1684, Norway.

Elo, S & Kyngäs, H 2008, The qualitative content analysis process, *Journal of advanced nursing*, 62(1), pp.107-115.

Faisal, M 2015, Research Analysis on Barriers to Green Supply Chain Management in Pharmaceutical Industries, *Review of Public Administration and Management 2015*, Pakistan.

Fawcett, SE, Ellram, LM & Ogden, JA 2014, *Supply chain management: from vision to implementation*, Pearson London, 3-29, London.

Federsel, HJ 2006, In search of sustainability: process R&D in light of current pharmaceutical industry challenges, *Drug Discovery Today*, 11(21), pp.966-974, Sweden.

Flick, U, von Kardoff, E & Steinke, I 2004, *A companion to qualitative research*, Sage learning, Berlin, Germany.

Foley, JA, DeFries, R, Asner, GP, Barford, C, Bonan, G, Carpenter, SR, Chapin, FS, Coe, MT, Daily, GC, Gibbs, HK & Helkowski, JH 2005, *Global consequences of land use*, Science, 309(5734), pp.570-574, USA.

Galletta, A 2013, *Mastering the semi-structured interview and beyond: From research design to analysis and publication*, NYU Press, New York, USA.

Gandhi, NR, Moll, A, Sturm, AW, Pawinski, R, Govender, T, Lalloo, U, Zeller, K, Andrews, J & Friedland, G 2006, *Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa,* 368(9547), pp.1575-1580, Washington, USA.

Ghauri, P 2004, Designing and conducting case studies in international business research*, Handbook of qualitative research methods for international business*, pp.109-124, Oxford.

Ghiani, G, Laporte, G & Musmanno, R 2004, *Introduction to Logistic Systems Planning & Control*, John Wiley & Sons Ltd, 1-288, United Kingdom.

Godfray, HCJ, Beddington, JR, Crute, IR, Haddad, L, Lawrence, D, Muir, JF, Pretty, J, Robinson, S, Thomas, SM & Toulmin, C 2010, *Food security: the challenge of feeding 9 billion people*, Science, 327(5967), pp.812-818, United Kingdom.

Gray, GL 2006, *The Whole Active Pharmaceutical Ingredient Story*. Viewed 10 August 2016, <https://secure.asq.org/perl/msg.pl?prvurl=http://asq.org/world-conference/2006/standards/whole-active-pharmaceutical-ingredient-story.pdf>

Green Jr, KW, Zelbst, PJ, Meacham & Bhadauria, VS 2012, Green supply chain management practices: impact on performance, *Supply Chain Management: An International Journal*, 17(3), pp.290-305.

Griskevicius, V, Tybur, JM & Van den Bergh, B 2010, Going green to be seen: status, reputation, and conspicuous conservation, *Journal of personality and social psychology*, 98(3), p.392.

Guang Shi, V, Lenny Koh, SC, Baldwin, J & Cucchiella, F 2012, Natural resource based green supply chain management, *Supply Chain Management: An International Journal*, 17(1), pp.54-67.

Guba, EG 1981, Criteria for assessing the trustworthiness of naturalistic inquiries*, Educational Communication and Technology: A Journal of Theory, Research, and Development,* 29(2), 75-91.

Hanasaki, N, Fujimori, S, Yamamoto, T, Yoshikawa, S, Masaki, Y, Hijioka, Y, Kainuma, M, Kanamori, Y, Masui, T, Takahashi, K & Kanae, S 2013, *A global water scarcity assessment under Shared Socio-economic Pathways–Part 2: Water availability and scarcity*, *Hydrol. Earth Syst. Sci,*17(7), pp.2393-2413, Japan.

Harvey, F 2014, *Global majority faces water shortages ,within two generations,* Viewed 15 August 2016, <http://www.nweei.org/images/pdf_files/Global_majority_faces_water_shortages_theguardian.pdf>

Health24.com, 2013, *The pharmaceutical industry at a glance*, Viewed 10 August 2016, <http://www.health24.com/Medical/Meds-and-you/Inside-the-lab/The-pharmaceutical-industry-at-a-glance-20130521>

Hoe, J & Hoare, Z 2012*, Understanding quantitative research: part 1, Nursing Standard*, 27(15), pp.52-57, United Kingdom.

Hugos, MH 2011, *Essentials of supply chain management* (Vol. 62), John Wiley & Sons, Canada.

Huynh, P 2013, '*Outbound transportation and its environmental impact: case company: Drilling Mud Corporation* ', Bachelors thesis, HAAGA-HELIA University of Applied Science.

Interagency Procurement Working Group, 2012, *UN Procurement Practitioner's Handbook*, IPWG, 1-41, Viewed 13 August 2016, <https://www.ungm.org/Areas/Public/pph/channels/PPH.pdf>

International Federation of Pharmaceutical Manufacturers & Associations, 2015, *The Pharmaceutical Industry And Global Health: Facts And Figures 2015*, Viewed 08 August 2016, <http://www.lif.se/globalassets/pdf/rapporter-externa/facts-and-figures-2015-ifpma.pdf>

Isaksson, L, Kiessling, T & Harvey, M 2014, Corporate social responsibility: Why bother, *Organizational Dynamics*, 43(1), pp.64-72, USA.

Ivona, B, Novačko, L & Ogrizović, D 2014, Processing reverse logistics inventories, *Pomorstvo/Journal of Maritime Studies*, 28(1).

Jiang, RJ & Bansal, P 2003, Seeing the need for ISO 14001, *Journal of Management Studies*, 40(4), pp.1047-1067.

Jiménez-González, C, Poechlauer, P, Broxterman, QB, Yang, BS, am Ende, D, Baird, J, Bertsch, C, Hannah, RE, Dell'Orco, P, Noorman, H & Yee, S 2011*,* Key green engineering research areas for sustainable manufacturing: A perspective from pharmaceutical and fine chemicals manufacturers, *Organic Process Research & Development,* 15(4), pp.900-911, Germany.

Jones, OAH, Voulvoulis, N & Lester, JN 2001, Human pharmaceuticals in the aquatic environment a review, *Environmental technology,* 22(12), pp.1383-1394, London, UK.

Jumadi, H & Zailani, S 2010, Integrating green innovations in logistics services towards logistics service sustainability: a conceptual paper, *Environmental Research Journal*, 4(4), pp.261-271.

Kamal, ANA & Fernando, Y 2015*,* Review of Supply Chain Integration on Green Supply Chain Management (GSCM), *Promoting Sustainable Practices through Energy Engineering and Asset Management,* p.348, USA.

Kamolkittiwong, A & Phruksaphanrat, B 2011, *An Analysis of Drivers Affecting Green Supply Chain Management Implementation in Electronics Industry in Thailand*, Thailand.

Khanna, I 2012, Drug discovery in pharmaceutical industry: productivity challenges and trends*, Drug discovery today*, 17(19), pp.1088-1102, Delhi, India.

Khetan, SK & Collins, TJ 2007, *Human pharmaceuticals in the aquatic environment: a challenge to green chemistry*, 107(6), pp.2319-2364, Pennsylvania.

Khiewnavawongsa, S & Schmidt, EK 2013, Barriers to green supply chain implementation in the electronics industry, *In Industrial Engineering and Engineering Management* (IEEM), 2013 IEEE International Conference on (pp. 226-230), IEEE, USA.

Kopnina, H & Washington, H 2016, Discussing why population growth is still ignored or denied, *Chinese Journal of Population Resources and Environment*, pp.1-11.

Kothari, CR 2004, *Research methodology: Methods and techniques*, New Age International, New Delhi, India.

Krefting, L 1991, Rigor in qualitative research: the assessment of trustworthiness, *The American Journal of Occupational Therapy*, 45(3), 214-222.

Krippendorff, K 2012, *Content analysis: An introduction to its methodology*, Sage, USA.

Krishnaswamy, KN, Sivakumar, AI & Mathirajan, M 2009, *Management research methodology: integration of principles, methods and techniques*, Pearson Education India, India.

Kumar, AS & Suresh, N 2009, *Operations Management*, New Age International Ltd Publishers, 30-251, New Delhi, India.

Kumar, P & Wagle, S 2014, Greening the supply chain, Viewed 10 August 2016, <http://www.supplychain247.com/paper/greening_the_supply_chain/bristlecone>

Kumar, R & Chandrakar, R 2012, Overview of green supply chain management: operation and environmental impact at different stages of the supply chain, *International Journal of Engineering and Advanced Technology*, 1, 1-6.

Kümmerer, K 2009, The presence of pharmaceuticals in the environment due to human use–present knowledge and future challenges, *Journal of environmental management*, 90(8), pp.2354-2366 Freiburg, Germany.

Kümmerer, K 2010, *Why Green and Sustainable Pharmacy? In Green and Sustainable Pharmacy*, (pp. 3-10). Springer Berlin Heidelberg, Berlin, Germany.

Lacroix, R 2008, *Green Procurement and Entrepreneurship*, Harokopeio University, Athens, Greece.

Lee, SY & Klassen, RD 2008, Drivers and enablers that foster environmental management capabilities in small-and medium-sized suppliers in supply chains, *Production and Operations Management,* 17(6), pp.573-586, Toronto, Canada.

Lin, RJ, Tan, KH & Geng, Y 2013, Market demand, green product innovation, and firm performance: evidence from Vietnam motorcycle industry, *Journal of Cleaner Production*, 40, pp.101-107.

Linton, JD, Klassen, R & Jayaraman, V 2007, Sustainable supply chains: An introduction, *Journal of operations management*, 25(6), pp.1075-1082.

Liu, X, Yang, J, Qu, S, Wang, L, Shishime & Bao, C 2012, Sustainable production: practices and determinant factors of green supply chain management of Chinese companies, *Business Strategy and the Environment,* 21(1), pp.1-16, China.

Luo, Z 2013, *Technological Solutions for Modern Logistics and Supply Chain Management*, IGI Global, 34-41, USA.

MacLeod, CE 2008, '*Nurses transforming the spousal caregiving experience: Health as Expanding Consciousness and patient recovery at home following cardiac surgery'*, PhD Thesis, Boston College.

Marschan-Piekkari, R & Welch, C 2004, *Handbook of qualitative research methods for international business*, Edward Elgar Publishing, USA.

McCafferty, D 2015, *Top 12 Tech Companies With Green Initiatives*, Viewed 03 May 2016, <http://www.baselinemag.com/it-management/slideshows/top-12-tech-companies-with-green-initiatives.html>

McKinnon, A, Browne, M, Whiteing, A & Piecyk, M, 2015, *Green logistics: Improving the environmental sustainability of logistics*, Kogan Page Publishers, London, UK.

McMurray, A 2004, *Research: A common sense approach*, Cengage Learning Australia, Australia.

Mellino, S & Ulgiati, S 2015, Monitoring Regional Land Use and Land Cover Changes in Support of an Environmentally Sound Resource Management, *In Sustainable Development, Knowledge Society and Smart Future Manufacturing Technologies* (pp. 309-321), Springer International Publishing, Switzerland.

Mentzer, JT, Stank, TP & Esper, TL 2008, Supply chain management and its relationship to logistics, marketing, production, and operations management, *Journal of Business Logistics*, 29(1), pp.31-46.

Monczka, M R, Handfield, B R, Giunipero, C L, Patterson, J L & Waters, D 2010, *Purchasing and Supply Chain Management*, South-Western Cengage Learning, USA.

Morrow, D & Rondinelli, D 2002, Adopting corporate environmental management systems:: Motivations and results of ISO 14001 and EMAS certification, *European Management Journal*, 20(2), pp.159-171

Mugabe, AY 2013, *Green Management Practices and Supply Chain Performance of pharmaceutical Companies in Nairobi*, Kenya.

Myers, JL, Well, A and Lorch, RF, 2010, *Research design and statistical analysis*, Routledge, New York.

Myers, MD 1997, Qualitative research in information systems, *Management Information Systems Quarterly,* 21(2), pp.241-242, New Zealand.

Najam, A, Runnalls, D & Halle, M 2007, *Environment and Globalization: Five Propositions*, International Institute of Sustainable Development, 1-6, Canada.

Narayana, AS, Elias, A & Pati, KR 2014, Reverse logistics in the pharmaceuticals industry: a systemic analysis, *The International Journal of Logistics Management*, 25(2), pp.379-398.

Naslund, D & Williamson, S 2010, What is Management in Supply Chain Management?- A Critical Review of Definitions, Frameworks and Terminology, *Journal of Management Policy and Practice*, 11, (4), 11-23.

Nelson, D, Marsillac, E & Rao, S 2012, Antecedents and evolution of the green supply chain, *Journal of Operations and Supply Chain Management*, *1*(1), pp.29-43.

Ng, FY, Yew, FK, Basiron, Y & Sundram, K 2012, A renewable future driven with Malaysian palm oil-based green technology, *Journal of Oil Palm*, Environment and Health (JOPEH), 2.

Novack, RA & Simco, SW 1991, The industrial procurement process: a supply chain perspective, *Journal of Business Logistics*, 12(1), p.145.

Ojo, E, Mbohwa, C & Akinlabi, E 2013, An Analysis of Green Supply Chain Management In South Africa And Nigeria: A Comparative Study, *International Conference on Integrated Waste Management and Green Energy Engineering* (pp. 315-319), Johannesburg, South Africa.

Oosthuizen, MJ 2009*, 'An analysis of the factors contributing to the emigration of South African nurses',* PhD thesis, University of South Africa.

Orrell, C, Bangsberg, DR, Badri, M & Wood, R 2003, *Adherence is not a barrier to successful antiretroviral therapy in South Africa*, 17(9), pp.1369-1375, Cape Town, South Africa.

Pertamin Hulu Energi, 2012, Green Supply Chain Management, Viewed 08 January 2016, <http://scm.phe-wmo.com/media/9967867a-8731-407c-99b9-265111b4f9e1/Green%20Supply%20Chain%20Management.pdf>

Pienaar, WJ & Vogt, JJ 2013, *Business Logistics Management: A Value Chain Perspective*, Southern Africa, Oxford Press, 4, 8, Southern Africa.

Pillay, K & Mbhele, TP 2015, *The challenges of green logistics in the Durban road freight industry*, South Africa.

Polit, DF & Beck, CT 2008, *Nursing research: Generating and assessing evidence for nursing practice*, Lippincott Williams & Wilkins, Philadelphia.

Porter, A 2009, *Operations Management*, Ventus Publishing, 1-64, Denmark.

Raworth, K, Sweetman, C, Narayan, S, Rowlands, J & Hopkins, A 2012, *Conducting Semi-Structured Interviews*, Oxfam, United Kingdom.

Ripton, JT 2014, 6 Companies that Have Great Environmental Initiative, Viewed 03 May 2016 http://www.renewableenergyworld.com/ugc/blogs/2014/03/6-companies-that-have-great-environmental-initiatives.html

Rosenkranz, B, Reid, M & Allen, E, 2016, Medicines development and regulation in Africa, *Journal of Medicines Development Sciences*, *1*.

Rossetti, CL, Handfield, R & Dooley, KJ 2011, Forces, trends, and decisions in pharmaceutical supply chain management, *International Journal of Physical Distribution & Logistics Management*, 41(6), pp.601-622.

Rouse, M 2010, Supply Chain Management, Viewed 01 July 2015, <http://searchmanufacturingerp.techtarget.com/definition/supply-chain-management>

Routroy, SR 2009, Antecedents and drivers for green supply chain management implementation in manufacturing environment, *ICFAI Journal of Supply Chain Management*, 6(1), pp.20-35.

Rushton, A, Croucher, P. & Baker, P 2014, *The handbook of logistics and distribution management: Understanding the supply chain*, Kogan Page Publishers, New Zealand.

Rutner, SM & Langley Jr, CJ 2000, Logistics value: definition, process and measurement, *The International Journal of Logistics Management*, 11(2), pp.73-82.

Sari, H 2012*,* Factors Determining Green Companies Performance in Indonesia: A Conceptual Model, *Procedia-Social and Behavioral Sciences*,57, pp.518-523, Bandung, Indonesia.

Schindler, PS & Cooper, PS 2005, *Business research methods*, Mcgraw-hill, London, United Kingdom.

Schneider, H 2002, *On the fault-line: the politics of AIDS policy in contemporary South Africa*, 61(1), pp.145-167, South Africa.

Schuh, JH 2011, *Assessment methods for student affairs*, John Wiley & Sons, USA.

Scipioni, A, Manzardo, A, Mazzi, A & Mastrobuono, M 2012, Monitoring the carbon footprint of products: a methodological proposal, *Journal of Cleaner Production*, 36, pp.94-101.

Sellitto, MA, Bittencourt, SA & Reckziegel, BI 2015*, Evaluating the Implementation of GSCM in Industrial Supply Chains: Two Cases in the Automotive Industry*, Chemical Engineering, 43, Brazil.

Servaes, H & Tamayo, A 2013, *The impact of corporate social responsibility on firm value: The role of customer awareness*, Management Science, 59(5), pp.1045-1061.

Seuring, S & Müller, M 2008, From a literature review to a conceptual framework for sustainable supply chain management*, Journal of cleaner production*, 16(15), pp.1699-1710.

Seuring, S 2013, *A review of modeling approaches for sustainable supply chain management. Decision support systems*, 54(4), pp.1513-1520, Netherlands.

Shah, N 2004, Pharmaceutical supply chains: key issues and strategies for optimisation, *Computers & chemical engineering,* 28(6), pp.929-941, London, United Kingdom.

Sheldon, RA 2014, *Green and sustainable manufacture of chemicals from biomass: state of the art*, *Green Chemistry*, 16(3), pp.950-963, Netherlands.

Shenton, AK 2004, *Strategies for ensuring trustworthiness in qualitative research projects*, Education for information, 22(2), pp.63-75, Amsterdam, Netherlands.

Sheu, J-B, Chou, YH & Hu, CC 2005, An integrated logistics operational model for green-supply chain management, *Transportation Research Part E: Logistics and Transportation Review*, 41(4), pp.287-313, Taipei, Taiwan.

Simchi-Levi, D 2002, *Designing and Managing the Supply Chain*, McGraw-Hill Higher Education, 1-24, USA.

Simchi-Levi, D, Chen, X & Bramel, J 2013, *The logic of logistics: theory, algorithms, and applications for logistics management*, Springer Science & Business Media, Boston.

Simons, NK, Gossner, MM, Lewinsohn, TM, Lange, M, Türke, M & Weisser, WW 2015, Effects of land-use intensity on arthropod species abundance distributions in grasslands, *Journal of Animal Ecology*, 84(1), pp.143-154.

Singh, YK & Bajpai, RB 2007, *Research methodology: Techniques and trends*. APH Pub, New Delhi, India.

Slack, N, Chambers, S & Johnston, R 2010, *Operations Management*, Pearson Education Limited, 6, 1-8, United Kingdom.

Srivastava, SK 2007, Green supply-chain management: a state-of-the-art literature review. *International journal of management reviews*, 9, 53-80.

Srivastava, SK 2008, *Network design for reverse logistics*, Omega, 36(4), pp.535-548, India.

Stadtler, H & Kilger, C 2000, *Supply chain management and advanced planning*, Berlin *et al*, Germany.

Steinberg, M, Blecher, L & Mercill, A 2001, From inactive ingredients to pharmaceutical excipients, *Pharmaceutical technology*, 25(7), pp.62-65, USA.

Stern, N 2006, What is the economics of climate change?, *World Economics-Henley On Thames*, 7(2), p.1, United Kingdom.

Stock, J & Boyer, S 2009, Developing a Consensus Definition of Supply Chain Management: A Qualitative Study, *International Journal of Physical Distribution and Logistics Management*, 39,(8), 692-711.

Taylor, SJ, Bogdan, R & DeVault, M 2015, *Introduction to qualitative research methods: A guidebook and resource*, John Wiley & Sons, USA.

Testa, F & Iraldo, F 2010, Shadows and lights of GSCM (Green Supply Chain Management): determinants and effects of these practices based on a multi-national study, *Journal of Cleaner Production,* 18(10), pp.953-962.

Teuteberg, F & Wittstruck, D 2010, *A systematic review of sustainable supply chain management*, Multikonferenz Wirtschaftsinformatik 2010, p.203.

Thai, KV 2009, *International Handbook of Public Procurement*, United States of America, Taylor & Francis Group,1-779, USA.

Tracy, SJ 2012, *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*, John Wiley & Sons, USA.

Trappey, AJ, Trappey, CV, Hsiao, CT, Ou, JJ & Chang, CT 2012, System dynamics modelling of product carbon footprint life cycles for collaborative green supply chains, *International Journal of Computer Integrated Manufacturing*, 25(10), pp.934-945.

Ubeda, S, Arcelus, FJ & Fau Linton J 2011, Green logistics at Eroski: A case study*, International Journal of Production Economics*, 131(1), pp.44-51.

Ulin, PR, Robinson, ET & Tolley, EE 2012*, Qualitative methods in public health: a field guide for applied research*, John Wiley & Sons, USA.

Underwood, JD 1993, Going green for profit, *Environmental Protection Agency Journal*., 19, p.9.

Utipharma.co.za, 2015, *A review of the South African Pharmaceutical landscape*, Viewed 10 August 2016, <http://www.utipharma.co.za/documents/198965/199128/UTi+November+2015+-+South+Africa+V1.pdf/c9c979e4-41ce-4d2c-94dc-e24f5d8c1b43>

Vachon, S & Klassen, RD 2006a, Extending green practices across the supply chain: the impact of upstream and downstream integration, *International Journal of Operations & Production Management*, 26(7), pp.795-821.

Vachon, S & Klassen, RD 2006b, Green project partnership in the supply chain: the case of the package printing industry, *Journal of Cleaner production,* 14(6), pp.661-671.

Van Rensburg, SLJ 2015, '*A framework in green logistics for companies in South Africa'*, MBA thesis, University of South Africa.

Van Teijlingen, E `& Hundley, V 2002, The importance of pilot studies, *Nursing Standard*, 16(40), pp.33-36.

Walker, H & Brammer, S 2009, Sustainable procurement in the United Kingdom public sector, *Supply Chain Management: An International Journal,*14(2), pp.128-137.

Walker, H, Di Sisto, L & McBain, D 2008, Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors*, Journal of purchasing and supply management*, 14(1), pp.69-85.

Welter, V 2012, Sustainable Procurement of pharmaceuticals- time to act, Viewed 15 August 2016, <http://www.who.int/medicines/areas/policy/IPC_dec2012_Volker_procurement.pdf>

Wisner, J, Tan, KC & Leong, G 2015, *Principles of supply chain management: a balanced approach*, Cengage Learning, USA.

Wolf, JA 2011, *Spaces of constant curvature* (Vol. 372). American Mathematical Soc, USA.

Wood, S & Reynolds, J 2013, Knowledge management, organisational learning and memory in UK retail network planning*, The Service Industries Journal*, 33(2), pp.150-170.

World Health Organisation.int, 2016, Who we are, what we do, Viewed 15 August 2016, <http://www.who.int/about/en/>

Wright, RE, Richey, RG, Tokman, M & Palmer, JC 2011, Recycling and reverse logistics, *The Journal of Applied Business and Economics*,12(5), p.9.

Wu, HJ & Dunn, SC 1995, Environmentally responsible logistics systems, *International journal of physical distribution & logistics management*, 25(2), pp.20-38.

Xie, Y & Breen, L 2012, Greening community pharmaceutical supply chain in UK: a cross boundary approach, *Supply Chain Management: An International Journal,* 17(1), pp.40-53.

Yin, RK 2015, *Qualitative research from start to finish*, Guilford Publications, New York, USA.

Zhang, L, Methipara, J & Lu, Y 2011, *Internalizing congestion and environmental externalities with green transportation financing policies*, In90th Annual Meeting of the Transportation Research Board, Washington, DC.

Zhou, F 2009, Study on the Implementation of Green Supply Chain Management in Textile Enterprises, *Journal of sustainable development*, 2, 75-79.

Zhu, Q & Sarkis, J 2004, Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises, *Journal of Operations Management,* 22, 265-289.

Zhu, Q, Sarkis, J & Lai, K-H 2007, Green supply chain management: pressures, practices and performance within the Chinese automobile industry*, Journal of Cleaner Production*, 15, 1041-1052.

Zhu, Q, Sarkis, J & Geng, Y 2005, Green supply chain management in China: pressures, practices and performance*, International Journal of Operations & Production Management*, 25(5), pp.449-468.

Zhu, Q, Sarkis, J & Lai, KH 2008, Confirmation of a measurement model for green supply chain management practices implementation, *International journal of production economics*, 111(2), pp.261-273.

Zigiaris, S 2000, *Supply Chain Management,* Innoregio project, BPR Hellas SA, 2-24, South Africa.

Zsidisin, GA & Siferd, SP 2001, Environmental purchasing: a framework for theory development, *European Journal of Purchasing & Supply Management*, 7(1), pp.61-73.p.61-73.

APPENDIX A
Ethical Clearance Letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

30 August 2016

Mr Aveshin Reddy (211542196)
School of Management, IT & Governance
Westville Campus

Dear Mr Reddy,

Protocol reference number: HSS/1350/016M
Project title: Factors affecting GSCM initiatives: A case study at Cipla Medpro Manufacturing

Full Approval – Expedited Application

In response to your application received on 29 August 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Professor MJ Naude
Cc Academic Leader Research: Professor Brian McArthur
Cc School Administrator: Ms Angela Pearce

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/6350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** xmbaso@ukzn.ac.za / snymsm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

APPENDIX B

INTERVIEW GUIDE

(Proposed Interview Time: 20 minutes)

Date: ----------

Organisation: ----------

Person Interviewed: ----------

Capacity: ----------

INTERVIEW GUIDE

1. INTRODUCTION

The introduction phase of this interview session will seek to ensure that the purpose of the study is clearly defined to the participants and to state the objectives of the study. The aim of this section is to also assure the participants of confidentiality in the information that they will make available, also the interviewer will request permission to record the individual responses of the participants.

Research Objectives

5. To provide insight into the green supply chain management initiatives in the planning, procurement, operations and logistics departments at Cipla Medpro.
6. To identify the factors affecting green supply chain management initiatives in the planning, procurement and logistics departments at Cipla Medpro.
7. To find out whether Cipla Medpro has procedures in place to overcome the factors that negatively impact on green supply chain management in the planning, procurement, logistics departments
8. If Cipla Medpro has such procedures in place, to provide insight into the procedures.

---

2. SECTION 1: GENERAL

The questions on this section will include:

- Name of participant:
- Position held by participant:
- How would you describe the organisations supply chain?
- Do you support green intiatives?
- Do you think that your organisation supports green initiatives?

2. SECTION 2: THE PHARMACEUTICAL INDUSTRY IN SOUTH AFRICA AND ITS COMPATIBILITY WITH GSCM INTIATIVES

- Is the pharmaceutical industry favourable or unfavourable for implementing GSCM initiatives?
- What is your reason for the above answer?
- Are the regulations that affect the pharmaceutical industry supportive or a hindrance to GSCM initiatives?
- Does the economic environment in South Africa affect the pharmaceutical industry? If so, how? Is it supportive or a hindrance to GSCM initiatives?
- Are there any other factors that occur in South Africa that affect GSCM initiatives?

4. SECTION 3: IDENTIFYING CIPLA MEDPRO MANUFACTURING'S GREEN INTIATIVES

The questions on this section will include:

- Is your department involved in any green initiatives?
- What Green initiatives is your department involved in?
- Can you provide a brief description of these initiatives?
- Do these initiatives benefit or hinder Cipla Mobeni overall?
- Are GSCM initiatives regional or international?
- Do staff members give their input into GSCM initiatives or is it generated by top management?

- Is there any way to convey your ideas to the decision makers?

5. SECTION 4: WHAT ARE SOME OF THE IMPLICATIONS AND VALUE ADD OF GSCM INTIATIVES AT CIPLA MEDPRO MANUFACTURING?

The questions on this section will include:

- From your experience what are the implications of Green Supply Chain Management initiatives at Cipla Medpro Manufacturing?
- Do you think that Green Supply Chain Management initiatives improve Cipla Mobeni's business performance or hinder it?
- What is the reason behind your conclusion?
- Is GSCM a good method to improve sustainability?
- In your view, is there any value add generated by Green Supply Chain Management initiatives at Cipla Medpro Manufacturing?
- What is the value add of Green Supply Chain Management initiatives at Cipla Medpro Manufacturing?
- How does this benefit Cipla Medpro Manufacturing?

6. SECTION 5: IDENTIFYING AND UNDERSTANDING FACTORS AFFECTING GSCM INTIATIVES AT CIPLA MEDPRO MOBENI:

The questions on this section will include:

- What are the factors that affect the Cipla Medpro Manufacturing?
- Could these factors affect GSCM initiatives? How so?
- In your experience what factors affect Green supply chain initiatives in your department, at Cipla Medpro Manufacturing?
- How do these factors affect Green Supply Chain Management initiatives? Is it positive or negative?
- Have you noticed any factors that affect Green Supply Chain Management initiatives in different departments at Cipla Medpro Manufacturing?

- How do these factors affect Green Supply Chain Management initiatives? Is it positive or negative?
- In your experience what is the most critical factor that affects Cipla Medpro manufacturing? What is your reasoning behind your answer?
- Does this factor positively affect Green Supply Chain Management initiatives at Cipla Medpro Manufacturing?

7. SECTION 6: WHAT REMEDIES DOES CIPLA MEDPRO MANUFACTURING HAVE IN PLACE TO OVERCOME THE FACTORS THAT NEGATIVELY AFFECT GSCM INITIATIVES?

The questions on this section will include:

- What remedies does Cipla Medpro Manufacturing have in place to overcome the factors that negatively affect Green Supply Chain Management initiatives?
- Are these remedies long or short term?
- In your view, do these remedies successfully combat these negative factors?
- Are there any remedies that you have identified to better combat these negative factors?
- Is there any way to convey your ideas to the decision makers?

GENERAL

Are there any other areas that you would like to discuss?

Thank you for your participation, your assistance is greatly appreciated.

APPENDIX C
LETTER OF CONSENT
UNIVERSITY OF KWAZULU-NATAL
School of Management, IT and Governance

Dear Respondent,

Research Project

Researcher: Aveshin Reddy (Telephone number: 0817271678) (Email: Aveshin.reddy@gmail.com)
Supervisor: Micheline Naude (Telephone number: 033 2606181) (Email: naudem@ukzn.ac.za)
Research Office: Humanities & Social Sciences Research Ethics Administration, Govan Mbeki Building, Westville Campus, Tel: + 27 (0)31 260 8350, Email: hssreclms@ukzn.ac.za

I, Aveshin Reddy am a Masters in Commerce student in the School of Management, Information Technology and Governance, at the University of KwaZulu-Natal. You are invited to participate in a research project entitled: *"Factors affecting GSCM initiatives: A case study at Cipla Medpro Manufacturing".*

The aim of this study is to: Explain how the GSCM functions at Cipla Medpro, to determine what the value add and the implications of GSCM are and identify the factors that affect GSCM as well as also to provide insight into the remedies that this company has in place to overcome the factors that negatively impact on GSCM.Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this research project. Confidentiality and anonymity of records will be maintained by the researcher and Management, Information Technology and Governance, UKZN. All collected data will be used solely for research purposes and will be destroyed after 5 years.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number_____).

The interview should take about 20 minutes to complete. Thank you for your time.

Sincerely

Researcher's signature_____ Date_____

Name of Researcher : Aveshin Reddy

This page is to be retained by participant

School of Management, IT and Governance

Research Project

Researcher: Aveshin Reddy (Telephone number: 0817271678) (Email: Aveshin.reddy@gmail.com)

Supervisor: Micheline Naude (Telephone number: 033 2606181) (Email: naudem@ukzn.ac.za)

Research Office: Humanities & Social Sciences Research Ethics Administration, Govan Mbeki Building, Westville Campus, Tel: + 27 (0)31 260 8350, Email: hssreclms@ukzn.ac.za

CONSENT

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

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion YES / NO

_____ _____

Signature of Participant Date

This page is to be retained by researcher

Appendix D

Gate Keepers Letter

UNIVERSITY OF
KWAZULU-NATAL

1 August 2016

Dear Mrs/Miss Jamie Lee Naidoo

PERMISSION TO CONDUCT RESEARCH

This letter is sent with regard to a student whom is doing a Masters in Commerce (Supply Chain Management) degree at the University of KwaZulu-Natal, as a request for permission.

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

Factors affecting Green Supply Chain Management: A case at Cipla Medpro Manufacturing

The supervisor of the student is Micheline Juliana Naude will be available at any stage to answer any queries or discuss any comments you may have and may be contacted on 083 3816078 or alternatively on my email: NaudeM@ukzn.ac.za. On behalf of the School of Management, Information Technology and Governance and our Masters 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.

The School of Management
College of Law and Management

Postal Address: Private Bag X01, Scottsville, Pietermaritzburg 3209, South Africa

Telephone: +27 (0)33 260 5181 Facsimile: +27 (0)33 260 5219 E-mail: [illegible]