

Sustainable Supply Chain Management in the Pharmaceutical Industry of UK

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Chapter 1: Introduction

1.1 Background

Over the past years, some prominent environmental issues, including global warming, resource depletion, and toxic gas emissions, have escalated around the world. As a result, environmental activists, policymakers, and governmental bodies have shifted their focus onto the notion of sustainability (Xie and Breen, 2012). Lately, the emerging concept of Sustainable Supply Chain Management (SSCM) has become an important constituent of the supply chain management literature. Besides the shareholders' goal to maximize market share, this concept drives supply chain operations intending to minimize negative impacts on the environment. It has also been linked with economic and social aspects (Rasool et al., 2016). Sustainable supply chain management is distinguished from the traditional concept of supply chain. Today, business firms and corporations operating across various industrial sectors have been adopting sustainable supply chain process and practises. They are able to witness improved performance and gain competitive advantage. Other benefits of sustainable supply chain include energy efficiency, appropriate handling of waste material and conservation of product life cycle.

Similar to other countries, the pharmaceutical industry is one of the organized business sectors in UK. Currently, a total of 386 companies have been licensed to manufacture and distribute pharmaceutical products (Khan and Subzwari, 2009). However, the multinational companies remain the key industry players and account for 55% business in the country. GlaxoSmithKline Plc (GSK), one of the largest multinational firms, was set up in 2001 in UK. It is regarded as the leading pharmaceutical firm. The company has been engaged in the manufacture of several products such as pharmaceuticals, vaccines, consumer healthcare and nutritional products (Rashmi, 2019). In order to align with global practices, GSK recognized the significance of sustainable supply chain management and has implemented relevant measures.

1.2 Problem Statement

As aforementioned, the concept of sustainable supply chain management has become essential for supply chain process and strategies. It enables organizations to integrate environmental concerns and sustainability into business operations (Verma and Gangele, 2012). The pharmaceutical

industry in UK has shown immense growth in the previous years. The level of competition between the leading pharmaceutical firms can be attributed for this expansion. As highlighted by Hamid and Ramish (2014), the pharmaceutical sector is needed to undertake efficient supply chain operations. For this purpose, it would be vital for firms to adopt sustainable supply chain which will help to boost their efficiency and performance as well as achieve cost savings. Although numerous studies have explored sustainable supply chain management, there is little literary evidence about how it is practiced at the pharmaceutical industry in UK. Also, there is an apparent knowledge gap of factors associated with sustainable supply chain.

1.3 Research Aim and Objectives

The primary aim of the research is to determine the implementation of sustainable supply chain process at GlaxoSmithKline Plc and the overall pharmaceutical industry in UK. Furthermore, the contribution of three main factors- environment management, health safety and risk management, and social responsibilities towards sustainable supply chain operations has been evaluated.

Taken into account the research aim, following objectives have been formed:

- To investigate the extent at which sustainable supply chain management is practiced at the case company and the pharmaceutical industry of UK.
- To explore the dimensions of environment management, health safety and risk management, and social responsibilities
- To determine the contribution of these factors towards sustainable supply chain practices.

1.4 Research Questions:

In the course of this study, below research questions have been resolved:

RQ1:

How is sustainable supply chain management being practiced across the pharmaceutical industry?

RQ2:

What are the different dimensions of sustainable supply chain process?

RQ3:

How do these dimensions contribute to sustainable supply chain management?

1.5 Significance

This research contributes to industrial practitioners and academics in multiple aspects. Firstly, the undertaken study offers comprehensive understanding of the concerned phenomenon, directed at the pharmaceutical industry. Second, leadership and management at these firms will gain knowledge on how to incorporate sustainable supply chain practices and manage them effectively. Furthermore, this dissertation will provide insights to policy makers and law makers. It can guide them to formulate strong policies and initiatives in relation to growing environmental concerns. By addressing the factors of sustainable supply chain, the research will make a significant contribution to the available literature. Besides fulfilling the gap, it can be a valuable source for future scholars and will stimulate their interest for further research.

1.6 Research Hypothesis

In line with the subject matter and review of literature, the research has tested the following hypothesis:

H1- There is a positive correlation between environment management and sustainable supply chain management in pharmaceutical industry.

H2- There is a positive association between health safety and risk management and sustainable supply chain management.

H3- There is a positive correlation between social responsibilities and sustainable supply chain management.

Chapter 2: Literature Review

2.1 Overview

The second chapter will set out the theoretical foundation, empirical foundation and conceptual framework that govern this dissertation. First, theoretical foundation deals with core theories and concepts related to the research subject followed by hypotheses development. Second, the empirical foundation will highlight some empirical and statistical findings about dependent and independent variables involved in the study. Lastly, a conceptual framework will be developed which illustrates the logical relation between dependent and independent variables.

2.2 Theoretical Foundation

This section is concerned with survey of available literature on the concept of sustainable supply chain management. It will also provide theoretical background of the primary constructs namely, environment management, health safety and risk management, and social responsibilities. Later, research hypotheses are developed and explained.

As stated earlier, there are nearly 400 firms operating in the pharmaceutical industry of UK. Out of them, 30 firms are multinational corporations that drive half of the total business. In UK, 80% of the medicines are obtained through local production (Khan and Subzwari, 2009). However, raw materials are imported from foreign suppliers. In order to maximize the efficiency and performance of this industrial sector, it has been emphasized that sustainable supply chain management is opted.

2.2.1 Sustainable Supply Chain Management

In a research study by Govindan et al. (2014), sustainable supply chain management has been defined as “The integration of environmental sustainability into supply chain management”. The concept strives to increase recycling, substitute toxic materials and reduce pollutants. Its study deals with resource consumption, energy efficiency and environmental influence as part of the supply chain (Rasool et al., 2016). The aim of sustainable supply chain is to reduce detrimental impacts of production and manufacturing process on the natural environment. The management involves people who are associated with the supply chain such as manufacturers, distributors, suppliers, retailers and consumers. The study by (Muchiri, 2011) posits that the goal of a

sustainable supply chain is to confine all types of wastes and prevent emission of harmful substances into the environment along with conservation of energy sources.

Rasool et al. (2016) stated that sustainable supply chain management assists the upstream and downstream processes within organizations. It has been further elaborated that this practise improves economic and social performance by optimizing ecological benefits. Sustainable practices are incorporated within different phases of the supply chain including raw material extraction and selection, product design, product development and reuse of material (Govindan et al., 2014). Some researchers have attempted to distinguish sustainable supply chain from traditional supply chain. It has been revealed that prominent differences between both forms of supply chain exist in terms of processes, operations, procedures, tools, motives, goals etc.

2.2.1.1 Triple Bottom Line (TBL)

The idea of sustainability has been originally derived from a theoretical model known as the 'Triple Bottom Line'. The model was introduced by Elkington in 1998 (Syed et al., 2019). TBL presents three distinct aspects or pillars of sustainability- environmental, economic and social. This theoretical model has served as framework for achieving sustainability in various domains. Similarly, TBL sets up foundation for sustainable practices associated with supply chain management. Firstly, the environmental aspect of the model refers to elements of the natural environment which are linked with the supply chain (Rostamzadeh et al., 2018). For instance, forms of energy for production, landfill deposits etc are considered. With the recent trend of sustainability, organizations and enterprises have been shifting towards green techniques. The second aspect is economic where organizational stability is discussed. According to this pillar, a firm will achieve stability when it successfully fulfills social and environmental concerns and align them with financial viability (Rostamzadeh et al., 2018). Thirdly, the social aspect of TBL model pertains to welfare of common people and society at large. It focuses on social issues within an organization such as business ethics, gender discrimination, fair wages etc.

2.2.1.2 Pharmaceutical Sector and Sustainable Supply Chain

Typically, the pharmaceutical industry is subjected to deal with some prominent concerns such as cost of raw product, low shelf lives of medicines and compromise on the integrity of products. Moreover, prevalence of counterfeit pharmaceutical products is an alarming issue (Hamid and Ramish, 2014). In particular, the pharmaceutical industry in UK is greatly exposed to these risks,

especially distribution of counterfeit drugs. However, it has been claimed that counterfeit products account for only 0.4% of the total medicines manufactured in the country (Khan and Subzwari, 2009).

As far as sustainability is concerned, firms operating in the pharmaceutical sector of UK have begun to show responsibility towards environmental and social concerns. According to Verma and Gangele (2012), this paradigm shift is also an outcome of increased pressure from international regulatory bodies which demand for sustainable products and practices. Under the sustainable supply chain management, the notion of sustainability is well integrated, ranging from the production facility to the selling outlet (Syed et al., 2019). The implementation of sustainable supply chain strategies has facilitated business firms to stand out among their competitors. Most importantly, sustainable practices have led to efficient material and energy consumption, waste management, innovation of eco-friendly products and elimination of environmental risks (Xie and Breen, 2012). On the other hand, sustainable supply chain management is an effective approach to discover any damage instantly, identify its root causes and rectify it.

2.2.1.3 Environment Management

The term 'Environment Management' refers to integration of organizational management and aspects related to sustainability and protection of the environment. A study by Jermittiparsert et al. (2019) suggested that environment management is a key element in sustainable supply chain and overall business operations. In general, the most detrimental impacts due to business activities occur through the supply chain on the environment. In this respect, it is best to monitor the entire life cycle of product and identify stages where the greatest environmental impact is caused so that actions are taken accordingly. Adhering with this principle, environment management covers all stages underlying the life cycle of products or services. It helps in the management of environmental impacts resulting from a firm's supply chain.

2.2.1.4 Health Safety and Risk Management

In generic context, the domain of health and safety is governed by laws, policies, rules and procedures with an aim for the protection of employees, common public and the environment. Thus, environmental health and safety is a broad term. In terms of organizational settings, health and safety refers to procedures and collective efforts to determine dangers and hazards within the workplace (Reese, 2018). The purpose of these efforts is to reduce exposure to harmful materials

or processes and prevent accidents. Another aspect of health and safety pertains to delivering awareness and training of emergency response, evacuation and accident prevention to employees (Reese, 2018). It is also stressed that all employees must be educated about protective equipment and measures. As the name implies, risk management deals with major risks posed to employees as well as the environment. For health, safety and risk management, there is a combination of technical disciplines and program encompassing environmental health and safety along with risk assessment and risk control (Yarahmadi et al., 2016).

2.2.1.5 Social Responsibilities

As defined by Schinckus et al. (2019), social responsibility is a concept which iterates that firms should incorporate social concerns within their business activities and operations. In fact, interaction with key stakeholders must also reflect social responsibilities. Another research has informed that “Social responsibility is an approach through which a corporation achieves a balance of economic, environmental and social imperatives”. Due to identical motives, the idea of social responsibility is frequently integrated into the concept of sustainable supply chain management. Today, supply chain management is liable to cater and deal with social problems and issues. Thus, it justifies the growing interest in social responsibility by supply chain literature.

2.2.2 Hypotheses Development:

Prior to this section, the main research subject and its three constructs have been reviewed. This section involves linking the primary constructs with the subject. Accordingly, research hypotheses formed in the first chapter are further developed.

Environment management is the first factor associated with sustainable supply chain management. As informed by the literature, it undertakes an overview of the production life cycle and caters areas where high pressure is inflicted over the environment due to supply chain process. In this way, environment management has an apparent link with sustainable supply chain management. Exploring the nature of this link, it is to note that environment management contributes to sustainability tremendously. The more effective is environment management, the more improvements in the sustainable supply chain. It points out that environment management has a positive impact on the sustainable supply chain. Thus, the first hypothesis H1 is developed as follows.

H1: There is a positive correlation between environmental management and sustainable supply chain management in the pharmaceutical industry.

The next construct refers to the health, safety, and risk management. This factor is a merger of health and safety aspects with risk management. In terms of sustainability, the guidelines underlying health and safety apply to the environment also. On the other hand, risk management will be liable to tackle environmental risks occurring throughout the supply chain. Therefore, this construct can be linked to sustainable supply chain management. Furthermore, many studies have explained the contribution of health and safety to sustainability. In this regard, it has been hinted that this factor produces a positive effect on sustainable supply chain management. Consequently, the research hypothesis H2 can be developed.

H2: There is a positive association between health safety and risk management and sustainable supply chain management.

Social responsibilities portray the last construct and factor associated with sustainable supply chain management in the pharmaceutical sector. A sense of social responsibility is accomplished when an organization successfully conducts business activities to resolve social issues. Corporate and social responsibility is not restricted to the wellbeing of people; rather it takes into account the responsibility owed to the environment. Thus, a link with sustainability exists. Due to its contribution to the sustainability of the environment, the idea of social responsibility has been included within sustainable supply chain management. As the literature advocates about its notable contribution, it implies that social responsibilities have a positive impact on a sustainable supply chain. Therefore, hypothesis H3 is formulated as.

H3: There is a positive correlation between social responsibilities and sustainable supply chain management.

2.3 Empirical Foundation

Taken into consideration the research hypotheses, it can be observed that the term ‘sustainable supply chain management’ has appeared in each of them. Thus, it has been designated as the dependent variable of the study whereas the primary constructs have been referred to as the independent variables. The empirical foundation section will present a detailed account of

empirical and statistical findings of previous studies about the research variables. At foremost, the dependent variable will be analyzed followed by three independent variables.

2.3.1 Dependent Variable

2.3.1.1 Sustainable supply chain management

To date, numerous research attempts centered on sustainable supply chain management have taken place. In the study by Hsu et al. (2013), key drivers of supply chain management that support environmental sustainability have been identified. Negi and Anand (2014) have examined the association between sustainable supply chain management and organizational performance. As a part of empirical investigations on sustainable supply chain management, the study by Green et al. (2012) aimed to evaluate the influence of sustainable measures on performance and practice. The research findings revealed that the application of a sustainable supply chain fosters improved economic and environmental performance. The study by Menzel et al. (2010) was conducted to examine the effect of sustainable production on the financial stability of pharmaceutical companies based in Europe. While no significant link was found between sustainable practices and corporate performance, a decreasing trend of energy consumption was noted.

2.3.2 Independent Variable

2.3.2.1 Environment management

The empirical research by Handfield et al. (2005) investigated how environmental management is adopted within supply chain management. It focused on supply chain strategies incorporated by firms operating in the US, Japan, and the UK. Besides the core subject matter, many studies laid their focus on different aspects of environmental management such as energy efficiency, water management, waste management, emission of toxic gases and chemicals, and packaging techniques. For instance, Muchiri (2011) observed a waste management system in the supply chain of manufacturing industries. The empirical study unfolded that adequate waste management prevents the formation of wastage during production, thus leading to source reduction.

2.3.2.2 Health, safety and risk management

The contemporary literature reports that there have been consistent efforts to optimize supply chains by business corporations and enterprises. For this purpose, scholars have strived to integrate health and safety aspects into sustainable supply chain management. As highlighted by Mani et al.

(2018), some positive effects of employees' health and safety have been observed over supply chain management. On the other hand, it has been noted by a few researchers that proper health and safety arrangements for workers would add to sustainable operations in a firm's supply chain management. In terms of risk management, recent trends, for instance, lean practices and outsourcing, place a significant contribution to the development of a sustainable supply chain.

2.3.2.3 Social responsibilities

The integration of social responsibility into sustainable supply chain management has remained the focus of many empirical types of research. One such study was conducted by Quatshie et al. (2016) where the relationship between supply chain management and social responsibilities in business was examined. Furthermore, in the study by Eriksson and Svensson (2015), it was aimed to find out what elements lead to social responsibility under the paradigm of sustainable supply chain management. The study by Zorzini et al. (2015) conducted a review of the sourcing of social responsibility for achieving sustainability in supply chain management. In addition to its findings, the study suggested further theoretical developments for the phenomenon. Similarly, Feng et al. (2017) surveyed the supply chain management literature to indicate social responsibility issues through the method of network analysis.

2.4 Conceptual Framework

So far, detailed accounts of the theoretical foundation and empirical foundation have been developed. Subsequently, the dependent and independent variables involved in this study have been identified. It is followed by linking the research subject with each primary construct. However, there is still a lack of logical association and flow of the research. With sufficient knowledge at hand, it is possible to construct a conceptual framework for the undertaken research.

The conceptual framework will notify the dependent and independent variables. It will demonstrate their correlation and interdependency with each other. The final conceptual framework is presented as follows.

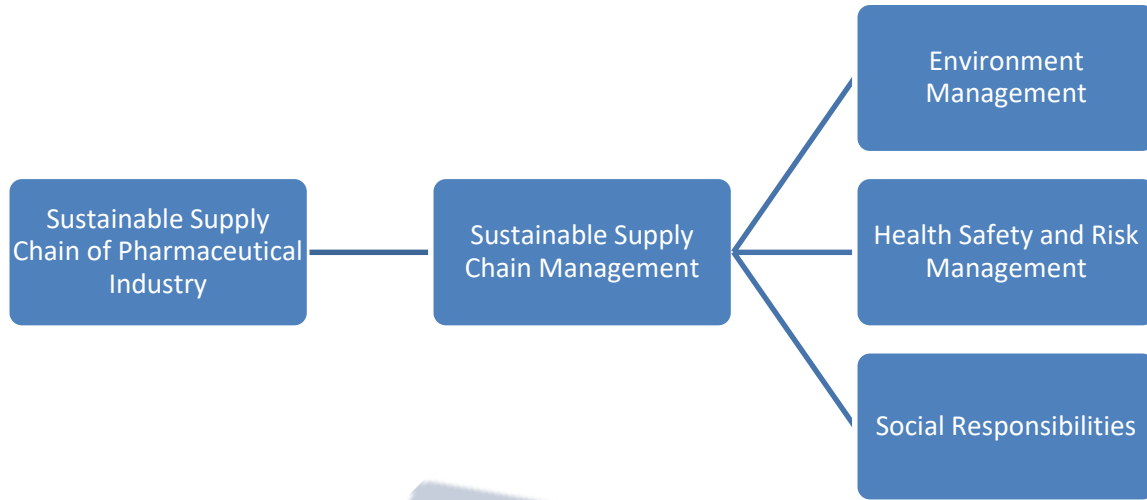
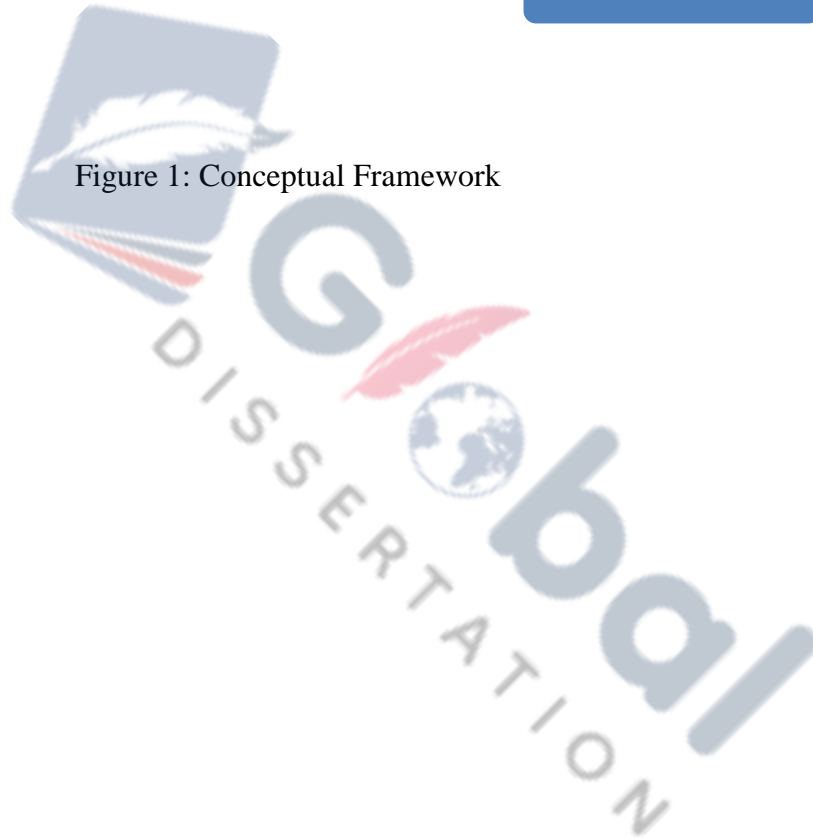


Figure 1: Conceptual Framework



Chapter 3: Research Methodology

3.1 Overview

The third chapter will set out a detailed discussion of the research methodology for the undertaken dissertation. Typically, the methodology determines a pathway to carry out the entire research. It guides on how to perform all research processes and activities. Therefore, the formulation of research methodology must align with the objectives and expected outcomes of a study. This chapter will also outline different aspects of methodology including research approach, philosophy, methods for data collection, and data analysis. Lastly, the ethical considerations of this research will be described.

3.2 Research Approach

Research approach can be defined as a comprehensive procedure that comprises of steps ranging from data collection to data evaluation and interpretation (Kumar, 2019). It governs broad assumptions that are made during the research work. The research approach must address the research problem under investigation. Therefore, the choice of an appropriate approach is crucial. Some of the common research approaches adopted by scholars are: inductive, deductive, abductive, explanatory, and exploratory. In line with the research questions, the deductive approach has been employed in this study.

In a deductive approach, the research process usually begins with setting up a theoretical foundation. It then proceeds by the formation of hypotheses from theory. Afterward, data is extracted and analyzed to test the validity of the research hypotheses (Ghauri et al., 2020). The deductive approach pertains to applying reasoning onto the research problem and reaching a valid outcome. This approach emphasizes more on forming specific results instead of simple, general conclusions. Moreover, the deductive approach is constituted of deductive reasoning and deductive logic (Kumar, 2019). For certain studies, a combination of inductive and deductive approaches is employed. It helps to gain a better and more detailed understanding of the subject matter.

In the undertaken research, distinct theoretical and empirical foundations have been laid out. Deductive reasoning has assisted to address the research questions. With the help of deductive

logic, the nature of the correlation between dependent and independent variables has been easily determined. Thus, the adoption of a deductive research approach is rational.

3.3 Research Philosophy

In general, every research process involves philosophical assumptions. Research philosophy is concerned with the philosophical underpinnings of the research approach and the overall process (Žukauskas et al., 2018). By definition, research philosophy refers to a belief through which data is collected, analyzed, and interpreted in a way to satisfy the research objectives (Kumar, 2019). Simply put, it sets a particular direction for the researcher to follow. The four philosophical views taken in research studies include positivism, interpretivism, pragmatism, and realism. Since the current study deals with qualitative and quantitative design method, the research philosophies of positivism and interpretivism have been employed.

3.3.1 Positivism

Positivism tends to observe a natural phenomenon with a philosophical approach. It iterates that natural processes can be regarded as observable social entities (Žukauskas et al., 2018). Positivism caters to factual and scientific data that is collected using individual senses or observation. This research philosophy is concerned with quantifiable observations and respective statistical analysis. For a study with positivism philosophy, the research approach is based on hypothesis development, data collection, and hypotheses testing i.e. deductive approach. Moreover, a positivist researcher complies with a structured methodology so that error-free development and testing of hypotheses is performed (Žukauskas et al., 2018)

3.3.2 Interpretivism

Interpretivism deals with the study of human beings as social actors and the assessment of similarities and differences between them (Žukauskas et al., 2018). In this research philosophy, social roles are interpreted and presented according to respective meanings and origins. Generally, interpretivism draws on the social world and the lives of social actors living in it. An interpretive researcher will approach a research phenomenon according to social sciences and may observe individual actions (Žukauskas et al., 2018). In simple words, interpretivism philosophy is inclined towards studying and interpreting aspects of human interest.

3.4 Methods for Data Collection

As the name implies, data collection refers to gathering and extracting information, facts, and statistics from different data sources. The process is used to collect raw as well as manipulated or processed data. Ghauri et al. (2020) defined data collection as “The process to gather and measure information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes”. In research studies, there are two methods used for collecting data namely primary data collection and secondary data collection. The primary method is used to collect raw or firsthand data whereas the second method is employed to collect data that has been already been used in previous publications.

In the undertaken research, primary data has been gathered with the tool of a survey questionnaire. The collected data is quantitative. Besides, former academic journal articles, thesis, and research papers have been surveyed to collect secondary data that is descriptive. Thus, both primary and secondary methods for data collection have been utilized.

3.4.1 Primary data collection

The methods for primary data collection are used to gather first hand or raw data. Primary data is one that has never been used before and no analyses have been performed over it (Ghauri et al., 2020). Moreover, primary data can exist in multiple forms such as numbers, words, expressions, or symbols. In the dissertation, the survey questionnaire has been employed as a tool to collect primary data.

3.4.2 Secondary data collection

As mentioned above, secondary data collection methods deal with the collection of secondary data. Any form of data that has been used earlier is referred to as secondary data. Similar to primary data, secondary data may be numeric or descriptive. In the undertaken study, secondary data has been extracted from books, journal articles, and research papers that have been published and peer-reviewed. Here, the secondary data is largely descriptive i.e. qualitative

3.4.3 Data collection tool- Survey questionnaire

As stated above, the survey questionnaire has been employed to collect primary data. A hard copy of the questionnaire instrument will be distributed among employees and senior management executives of the case company, GlaxoSmithKline Plc. The questionnaire has been administered

by the researcher himself. In terms of the instrument design, a total of 12 open-ended statements have been included in the questionnaire. Against these statements, research participants have marked their grades on a five-point Likert scale. Every respondent has been allotted 20 minutes to complete the survey questionnaire.

3.4.4 Sample size

This research draws on a sample size of 30. It means that 30 participants have been made part of this study.

3.5 Method for Data Analysis

Data analysis is the process where different numerical, inferential, and statistical operations are applied to the collected data. The choice of data analysis method depends on the nature of data (Ghauri et al., 2020). Consequently, quantitative data analyses have been performed in this research as the primary data is quantitative.

3.5.1 Quantitative analysis

This data analysis method applies to numeric data. Quantitative analysis has been carried out with the help of SPSS, a software package for inferential and statistical analysis. Several mathematical procedures have been performed over the quantitative data.

Chapter 4: Data Analysis

4.1 Overview

The chapter will be broadly concerned with the evaluation and analysis of primary data. As described in the previous chapter, a survey has been carried out to gain insights into sustainable supply chain operations at the case company. The responses obtained against each statement in the survey questionnaire have been simulated through the SPSS tool. This chapter will present both descriptive and inferential statistical analyses followed by their explanation.

4.2 Descriptive Frequency Analysis

In the current research, descriptive statistics have been applied to the primary quantitative data. In the descriptive analysis, the responses based on point scale are coded and their corresponding frequencies are estimated. In this section, the descriptive frequency analysis of responses against each statement is determined. To get a clear picture, frequencies are demonstrated through the use of bar charts.

The first three statements in the survey questionnaire pertain to the variable 'Environment Management'. The first statement inquires about the effectiveness of the management system to identify environmental risks during production and manufacturing. Out of 140 participants, 98 participants i.e. 70% have shown their agreement with the statement while 20 participants (14.3%) are found to strongly agree. Here, 12.1% of the participants have indicated a neutral response to the statement. On the other hand, 2.1% and 1.4% of participants tend to disagree and strongly disagree, respectively.

		EM1		Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Strongly Disagree	2	1.4	1.4	1.4
	Disagree	3	2.1	2.1	3.6
	Neutral	17	12.1	12.1	15.7
	Agree	98	70.0	70.0	85.7
	Strongly Agree	20	14.3	14.3	100.0

Total	140	100.0	100.0
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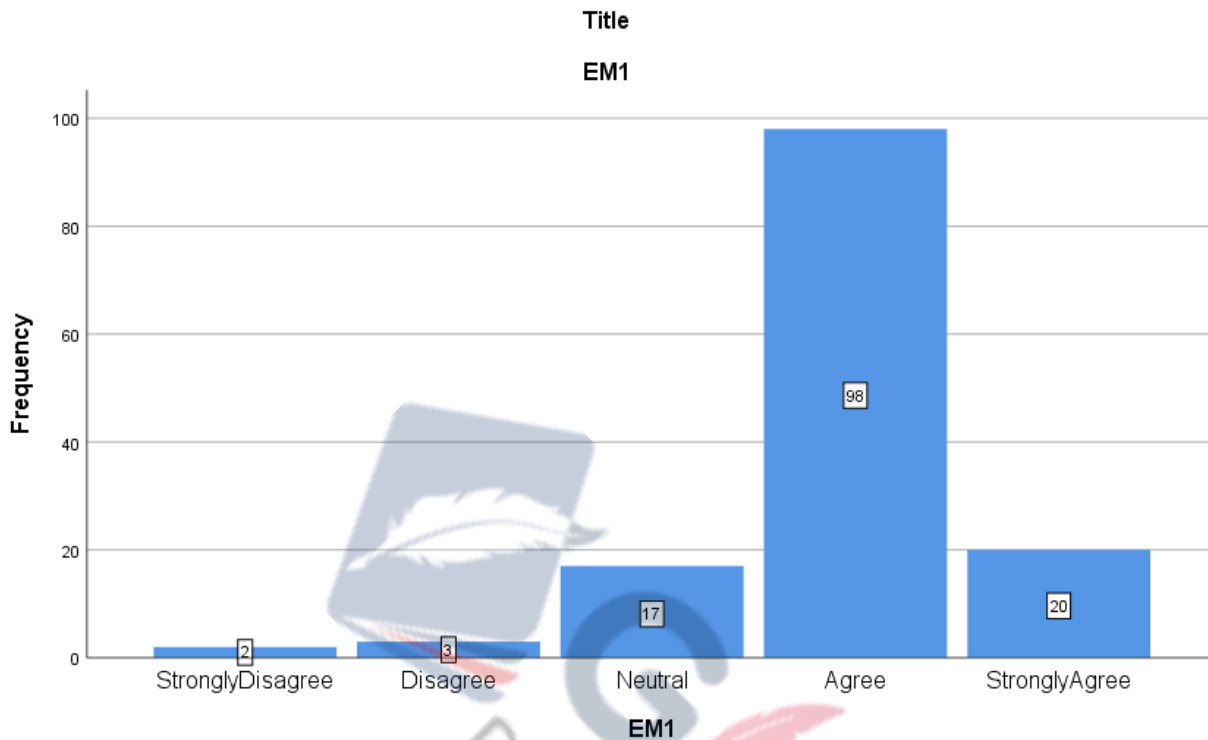


Figure 2: Responses against Statement 1

The second statement examines whether different environmental aspects such as energy management, water management, etc are being catered by the company. In response to this statement, 78 survey-takers (55.7%) tend to agree. However, 35 participants have shown a neutral response, making up 25% distribution. Out of 140 valid responses, 19 participants i.e. 13.6% have indicated strong agreement while 7 participants tend to disagree with this statement. Interestingly, only one respondent (0.7%) opted for strongly disagree.

EM2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	1	.7	.7	.7
	Disagree	7	5.0	5.0	5.7
	Neutral	35	25.0	25.0	30.7

Agree	78	55.7	55.7	86.4
StronglyAgree	19	13.6	13.6	100.0
Total	140	100.0	100.0	

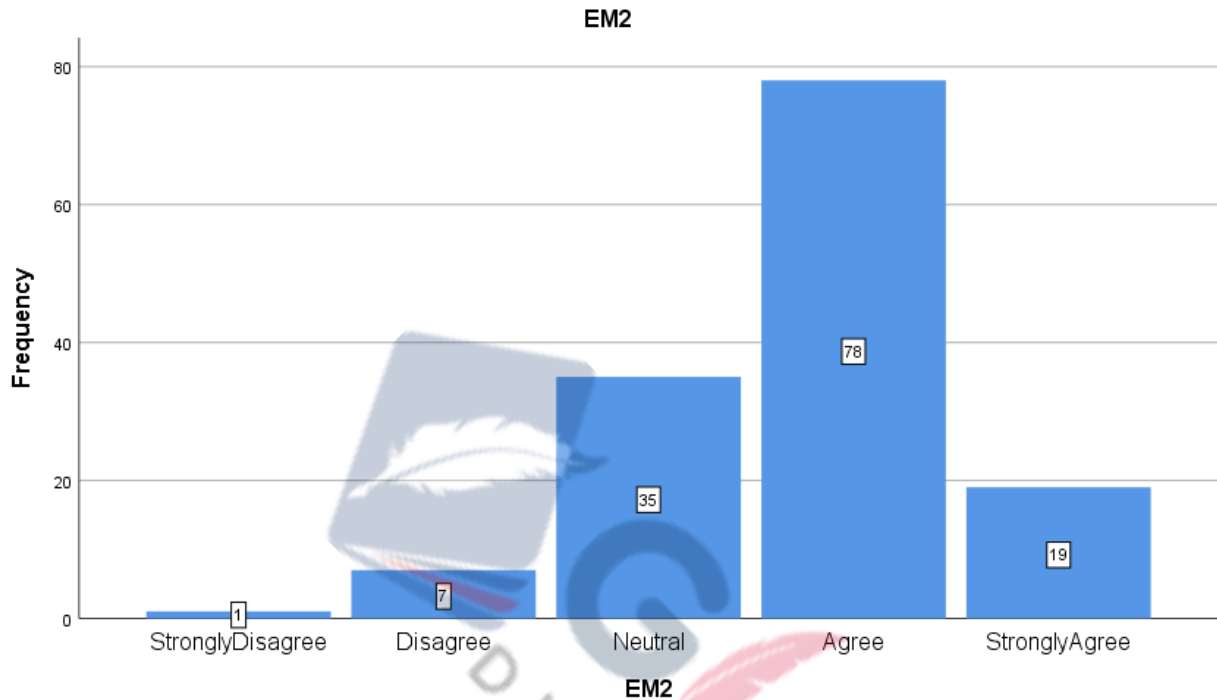


Figure 3: Responses against Statement 2

The third statement is related to reducing, reusing, and recycling of packaging materials at production facilities of the company. Here, nearly half (50.7%) of the respondents i.e. 71 survey takers are found to agree while 29 people (20.7%) have marked ‘strongly agree’ against the statement. Moreover, 22 participants i.e. 15.7% have remained neutral. On the contrary, 11 respondents disagree followed by 7 respondents who strongly disagree.

		EM3			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	7	5.0	5.0	5.0
	Disagree	11	7.9	7.9	12.9
	Neutral	22	15.7	15.7	28.6

Agree	71	50.7	50.7	79.3
StronglyAgree	29	20.7	20.7	100.0
Total	140	100.0	100.0	

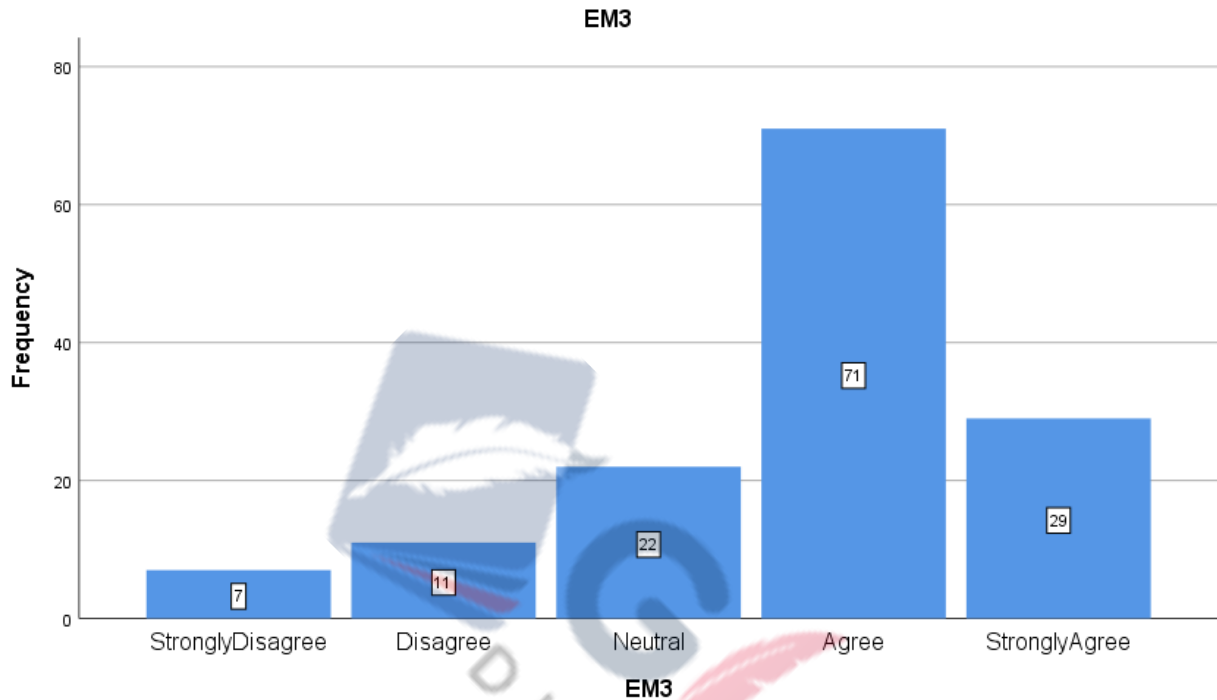


Figure 4: Responses against Statement 3

In the survey questionnaire, the second section consists of three statements regarding the ‘health, safety, and risk management’ factor. The fourth statement aims to check how the pharmaceutical company adheres to health and safety laws. It has been computed that 81 respondents (57.9%) agree while 39 respondents (27.9%) strongly agree to health and safety compliance by the company. In response to this statement, 14 participants have remained neutral. On the other hand, 4 respondents and 2 respondents tend to disagree and strongly disagree with the company’s compliance, respectively.

		HSRM1			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	2	1.4	1.4	1.4
	ee				

Disagree	4	2.9	2.9	4.3
Neutral	14	10.0	10.0	14.3
Agree	81	57.9	57.9	72.1
StronglyAgree	39	27.9	27.9	100.0
Total	140	100.0	100.0	

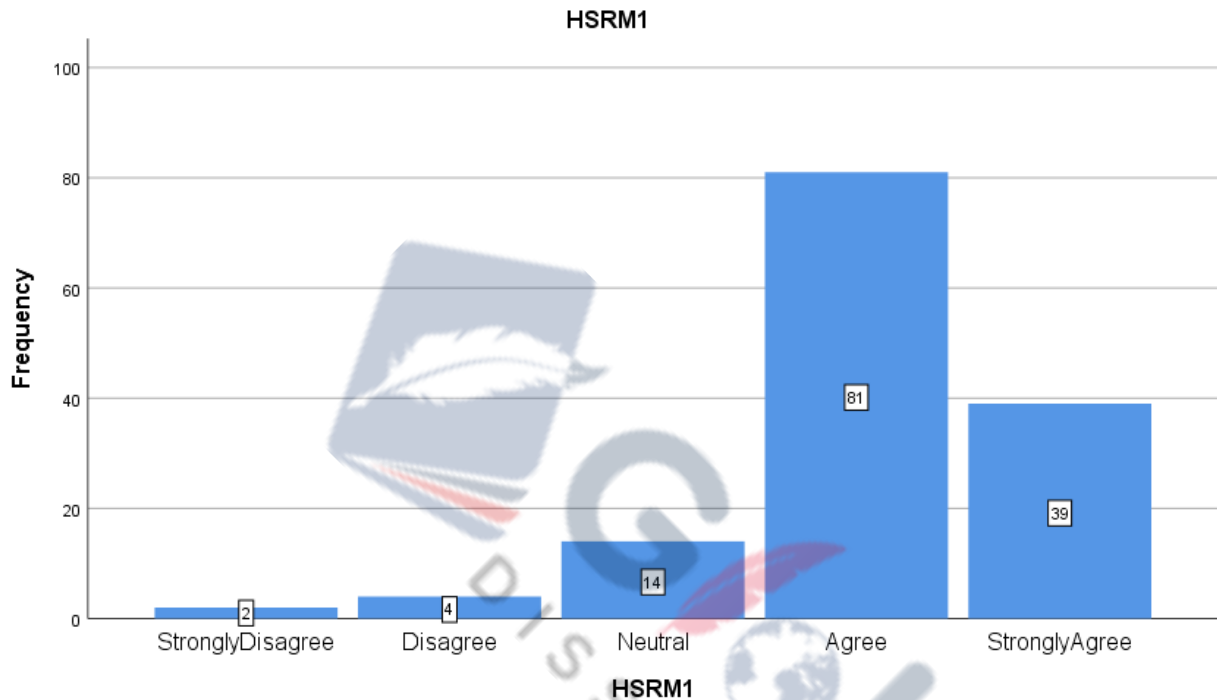


Figure 5: Responses against Statement 4

The fifth statement inquires whether there are sufficient measures in terms of safe and well-maintained machinery. Almost half i.e. 71 participants have reflected their agreement, making up 50.7% of the total distribution. It is interesting to note that 36 respondents (25.7%) tend to strongly agree whereas 27 respondents (19.3%) have remained neutral. This statement has been marked with disagree and strongly disagree with 3 participants each.

		HSRM2			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	3	2.1	2.1	2.1

Disagree	3	2.1	2.1	4.3
Neutral	27	19.3	19.3	23.6
Agree	71	50.7	50.7	74.3
StronglyAgree	36	25.7	25.7	100.0
Total	140	100.0	100.0	

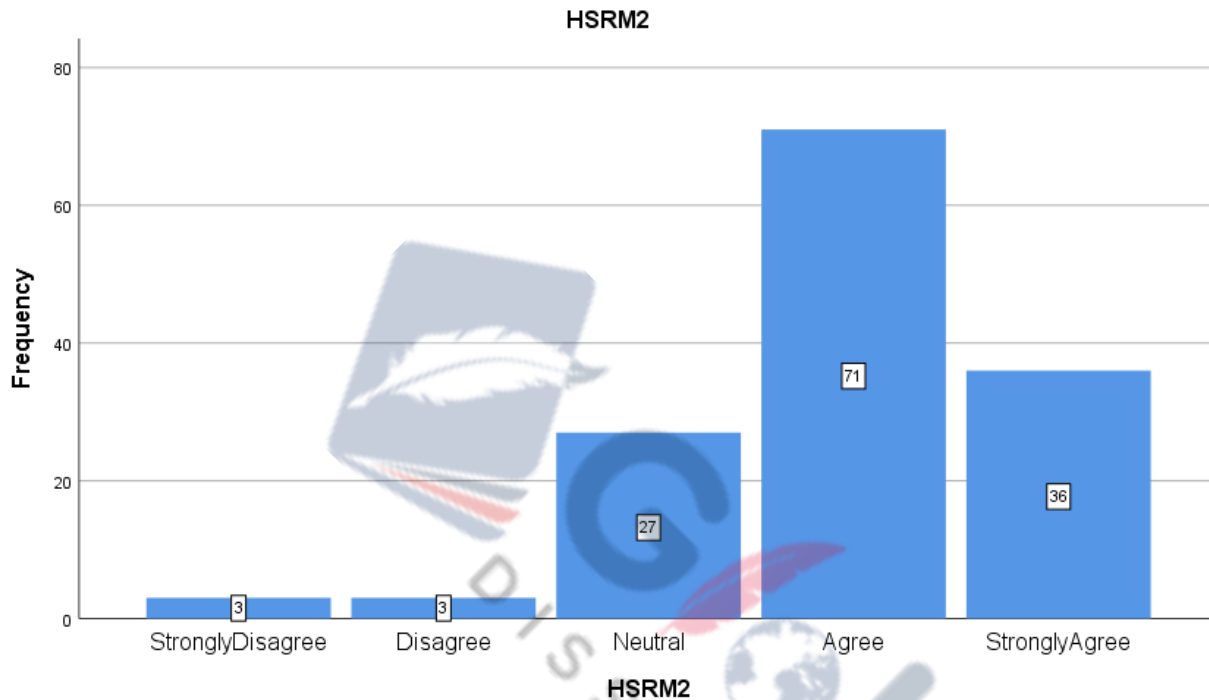


Figure 6: Responses against Statement 5

The sixth statement has probed into emergency response and evacuation procedures implemented by the case company. Out of 139 valid responses, more than half of the respondents tend to agree, which makes up a proportion of 61.2%. Furthermore, 24 participants i.e. 17.3% have shown strong agreement while 23 participants i.e. 16.5% have given neutral responses. 6 participants are found to disagree with the statement whereas only 1 participant strongly disagrees.

		HSRM3			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	1	.7	.7	.7

Disagree	6	4.3	4.3	5.0
Neutral	23	16.4	16.5	21.6
Agree	85	60.7	61.2	82.7
StronglyAgree	24	17.1	17.3	100.0
Total	139	99.3	100.0	
Missing System	1	.7		
Total	140	100.0		

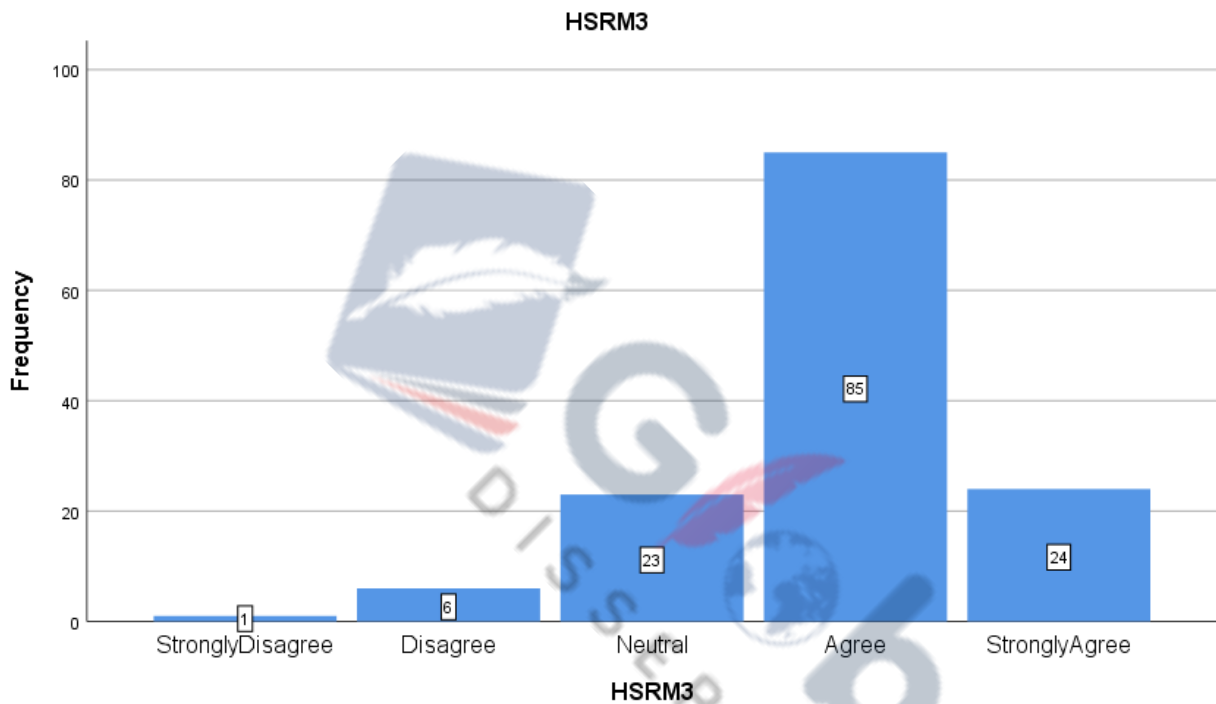


Figure 7: Responses against Statement 6

The next three statements are concerned with another independent variable ‘social responsibilities’. The seventh statement in the survey questionnaire investigates the corporate and social responsibility policy. Here, 80 participants i.e. 57.1% have responded with ‘agree’. This percentage is seconded by 32 participants, making up 22.9%, who tend to strongly agree. On the other hand, the neutral response has been obtained from 21 survey-takers (15.0%). The statement has obtained 3.6% responses for ‘disagree’ and 1.4% for ‘strongly disagree’.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	2	1.4	1.4	1.4
	Disagree	5	3.6	3.6	5.0
	Neutral	21	15.0	15.0	20.0
	Agree	80	57.1	57.1	77.1
	StronglyAgree	32	22.9	22.9	100.0
	Total	140	100.0	100.0	

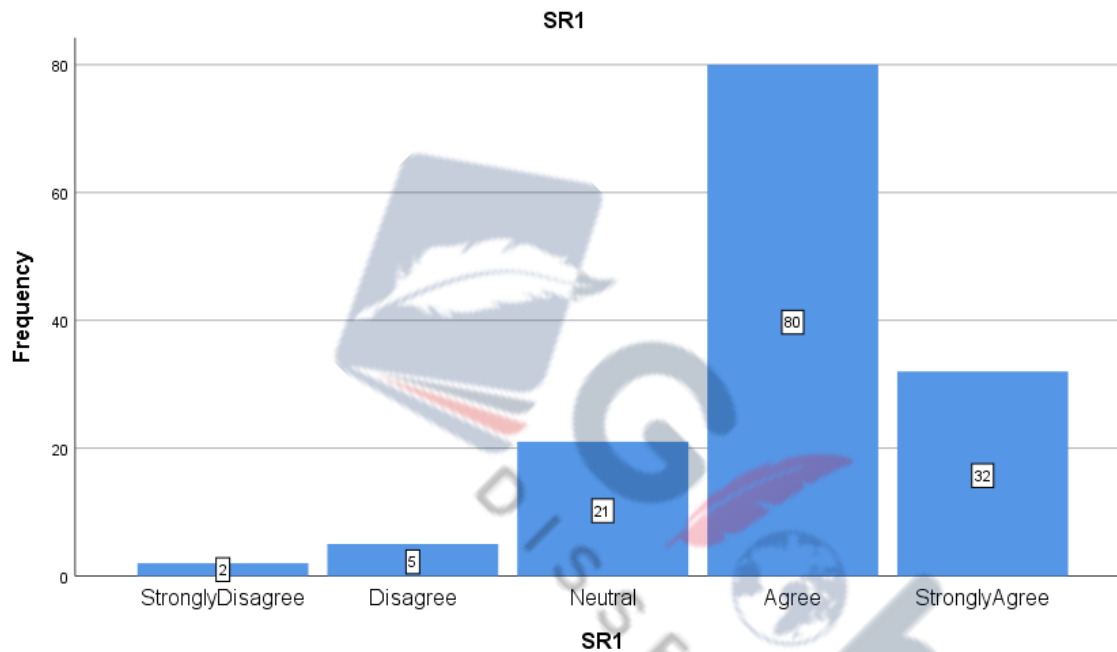


Figure 8: Responses against Statement 7

In the eighth statement, adherence to the performance management system with social regulations has been investigated. Again, more than half of the participants i.e. 58.6% have agreed with the statement. This is followed by 25 survey takers who responded with ‘strongly agree’ and 23 survey takers responding with ‘neutral’. On the contrary, 6.4% of participants disagreed followed by 0.7% who strongly disagreed.

SR2

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	StronglyDisagree	1	.7	.7	.7
	Disagree	9	6.4	6.4	7.1
	Neutral	23	16.4	16.4	23.6
	Agree	82	58.6	58.6	82.1
	StronglyAgree	25	17.9	17.9	100.0
	Total	140	100.0	100.0	

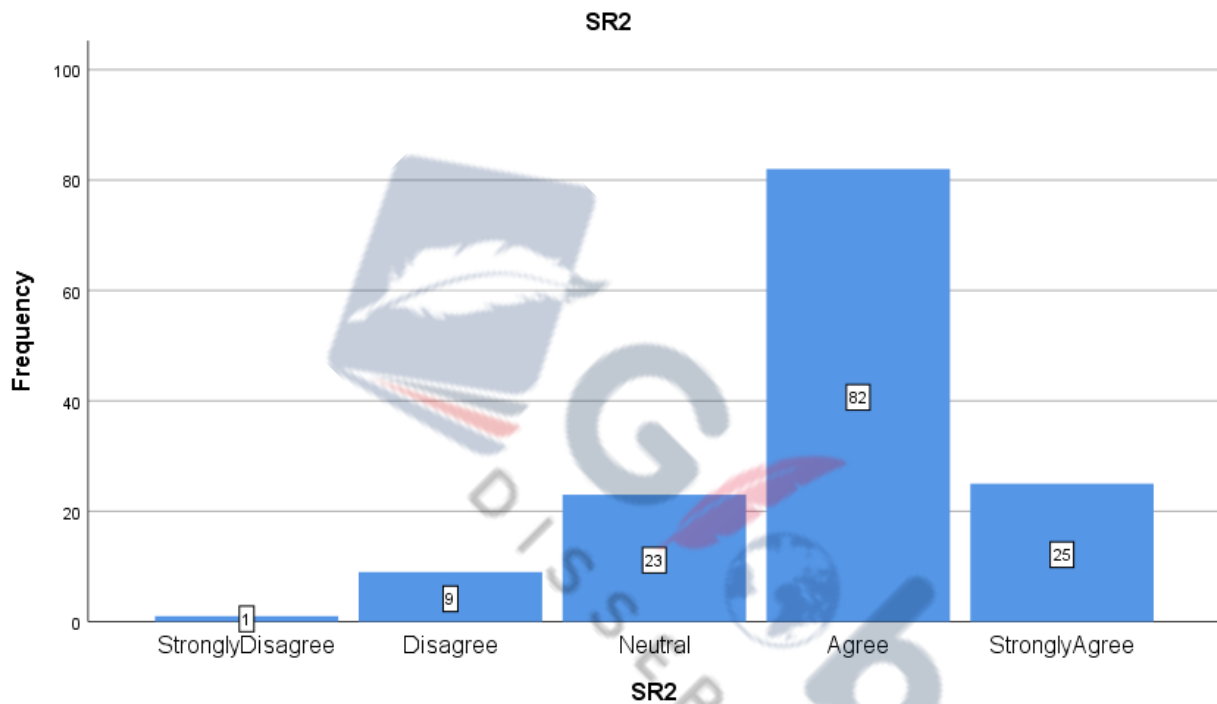


Figure 9: Responses against Statement 8

The ninth statement examines the social policy of the company regarding forced labor, child labor, and discrimination. The 138 valid responses against this statement form interesting trends. The frequency estimations reveal that 62 participants (44.9%) tend to agree followed by 40 participants (29.0%) who strongly agreed. This statement obtained 13.8% neutral responses. On the other hand, 11 participants have indicated disagreement while 6 participants are found to strongly disagree.

SR3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	6	4.3	4.3	4.3
	Disagree	11	7.9	8.0	12.3
	Neutral	19	13.6	13.8	26.1
	Agree	62	44.3	44.9	71.0
	StronglyAgree	40	28.6	29.0	100.0
	Total		138	98.6	100.0
Missing	System	2	1.4		
Total		140	100.0		

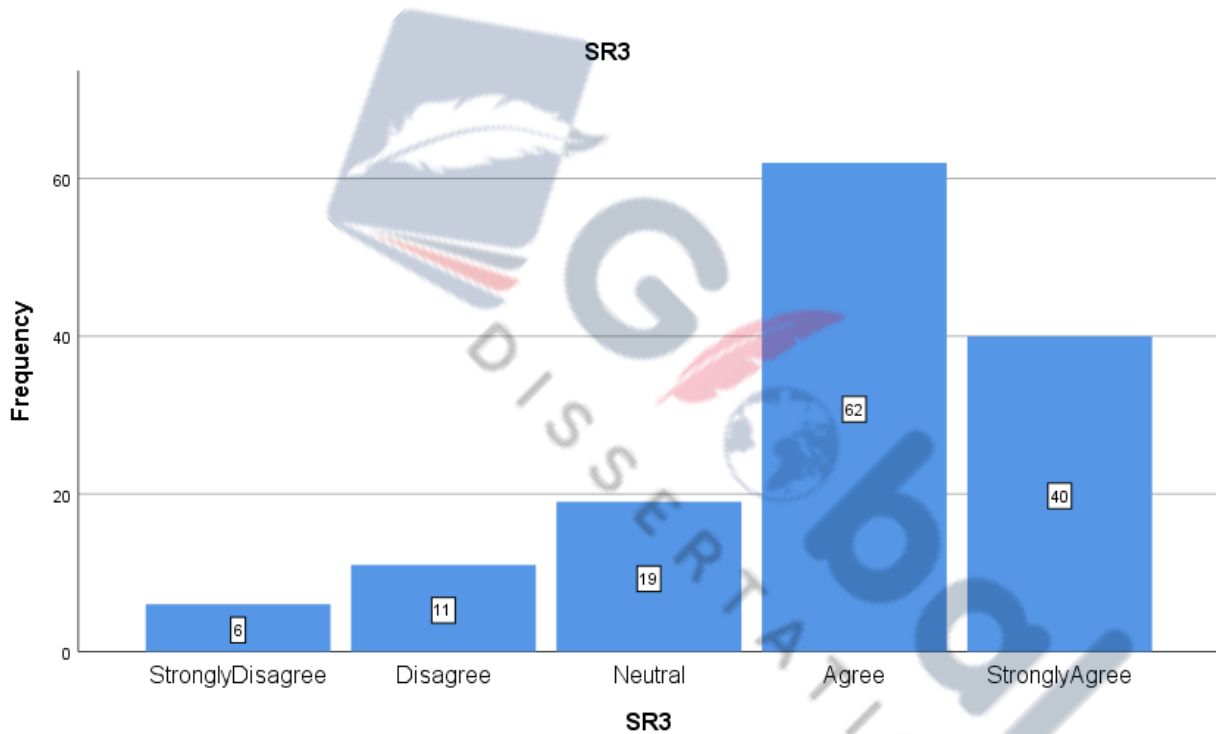


Figure 10: Responses against Statement 9

In the survey questionnaire, the last three statements pertain to the dependent variable 'sustainable supply chain management'. The tenth statement asserts that a sustainable supply chain is implemented. Out of 140 survey takers, 81 participants i.e. 57.9% indicated that they agree. However, it must be noted that 20.7% of the participants have given neutral responses against the

statement whereas 17.9% of participants strongly agree. Contradicting with this statement, 4 participants are found to disagree and 1 participant is found to strongly disagree.

		SCM1			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	1	.7	.7	.7
	Disagree	4	2.9	2.9	3.6
	Neutral	29	20.7	20.7	24.3
	Agree	81	57.9	57.9	82.1
	StronglyAgree	25	17.9	17.9	100.0
	Total	140	100.0	100.0	

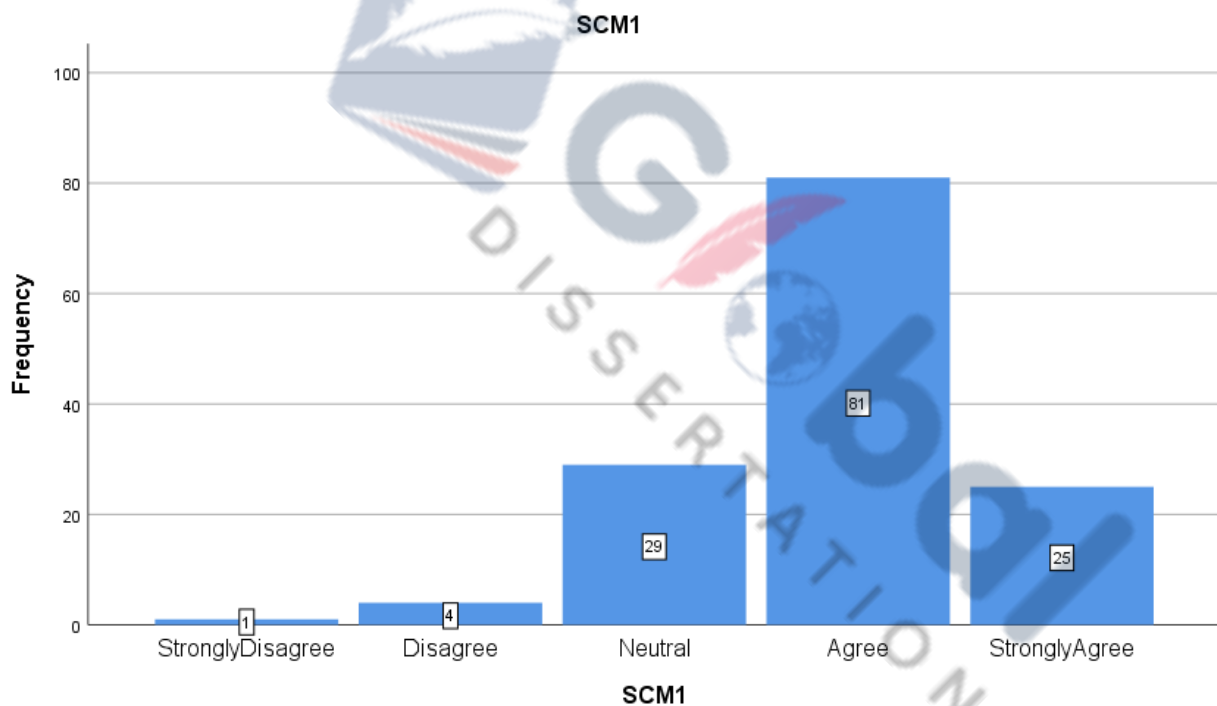


Figure 11: Responses against Statement 10

The next statement inquires about the implementation of tools to support sustainable supply chain management. Here, 138 valid responses have been obtained. This statement has been marked with 'agree' by 85 participants, constituting 61.6%. However, it has obtained a neutral response from

17.4% of the respondents while 16.7% have strongly agreed. In contrast, 6 participants are found to disagree.

		SCM2			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	4.3	4.3	4.3
	Neutral	24	17.1	17.4	21.7
	Agree	85	60.7	61.6	83.3
	StronglyAgree	23	16.4	16.7	100.0
	Total	138	98.6	100.0	
Missing	System	2	1.4		
Total		140	100.0		

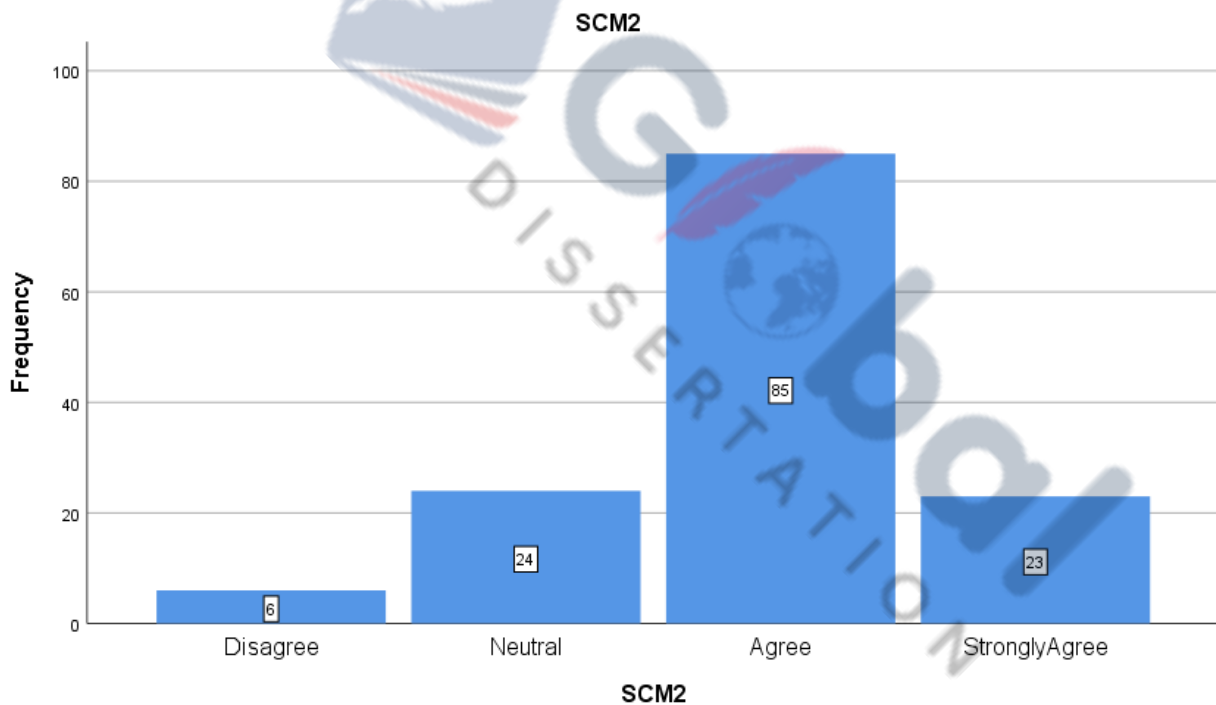


Figure 12: Responses against Statement 11

The twelfth statement affirms that an accurate audit is performed over supply chain practices. Here, 80 survey takers i.e. 57.1% reflected their agreement with the statement. It is followed by 27

participants (19.3%) who strongly agree while 24 participants (17.1%) have remained neutral. On the contrary, this statement has been marked with 'disagree' and 'strongly disagree' by 5.0% and 1.4% of the participants, respectively.

SCM3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	StronglyDisagree	2	1.4	1.4	1.4
	Disagree	7	5.0	5.0	6.4
	Neutral	24	17.1	17.1	23.6
	Agree	80	57.1	57.1	80.7
	StronglyAgree	27	19.3	19.3	100.0
	Total	140	100.0	100.0	



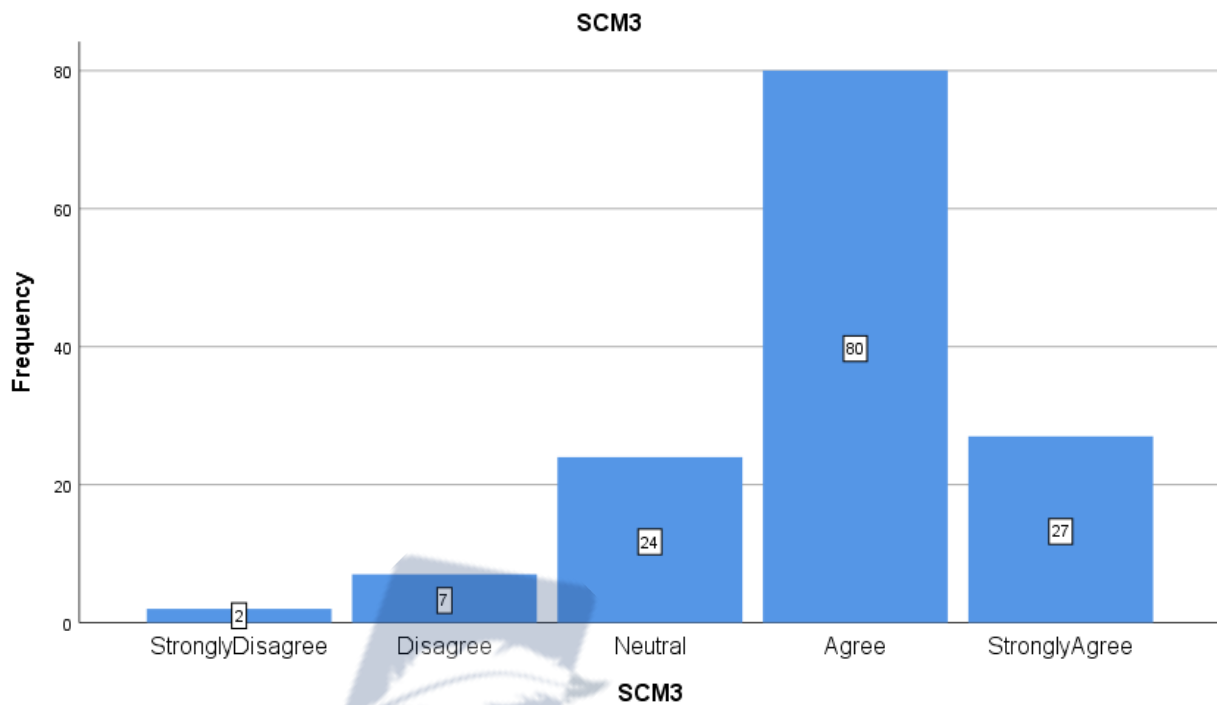


Figure 13: Responses against Statement 12

4.3 Inferential Analysis

By principle, inferential statistics is concerned with evaluating data to form conclusions that are beyond simple interpretation. While descriptive statistics deals with identifying and describing trends in the data, the inferential statistic is used to draw inferences regarding more general conditions. To perform inferential analysis, several general statistical procedures and models have been applied to the quantitative data.

4.3.1 Linear Regression:

The models for linear regression are used to determine the relationship between two factors or variables. In general, the factor to be predicted is known as the dependent variable. Linear regression involves two main measures- R-value and R-squared value. The latter refers to the goodness-of-fit measure which indicates variance in the dependent variable. Typically, the higher value of the R-squared measure will present a better fit for the model. Overall, the linear regression model measures the strength of the relationship between variables based on the R squared value.

The following table summarizes the results of the linear regression calculated for variables involved in the dissertation.

Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.522 ^a	.272	.255	.49574

a. Predictors: (Constant), Social Responsibilities, Environment Management, Health Safety Risk mang

Table 1: Linear Regression model

According to the model summary, R has a value of 0.522, and the value of R squared is 0.272. It makes up for data fit up to 27.2%. This lower value for R squared hints about the weak relationship between dependent and independent variables. However, the relationship may not be much weak to be ignored. The linear regression model reveals that there are chances to validate an alternative relationship.

4.3.2 ANOVA:

The word ANOVA is an acronym for ‘Analysis of variance’. This statistical procedure is used to calculate the difference between applied statistical models and their associated estimation procedures across a provided sample. ANOVA aims to predict whether there are any significant or insignificant differences between one or more independent statistical group. Typically, a summary table of ANOVA sets out five different measurements. However, the ‘Sig’ value is important since it identifies the significance and insignificance of independent statistical procedures. Moreover, the ‘ α ’ measure determines whether the alternative hypothesis has been accepted or rejected. In this regard, if a significant value is less than 0.05, the hypothesis will be accepted. Otherwise, if a significant value is above 0.05, the hypothesis will be rejected. In the undertaken study, the ANOVA model is demonstrated through two distinct tables.

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	12.122	3	4.041	16.442	.000 ^b
Residual	32.440	132	.246		
Total	44.562	135			

a. Dependent Variable: sustainable sp

b. Predictors: (Constant), social responsibilities, Environment Management, Health Safety risk mang

Table 2: ANOVA model

Taking a look at the above table, the Sig. value is found to be 0.000b. Since this value is less than 0.05, it indicates that the alternative hypothesis has been accepted. The table sets forth other statistical findings associated with regression and residual analysis. They offer theoretical connotations in terms of environmental management, social responsibilities, and health safety and risk management for a sustainable supply chain at the company.

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.677	.348		4.818	.000
Environment Management	.210	.085	.214	2.476	.015

Health Safety risk mang	.393	.088	.404	4.439	.000
Social responsibilities	-.041	.072	-.048	-.570	.569

a. Dependent Variable: sustainable sp

Table 3: Table for coefficients

The second table primarily informs about the values of coefficients for dependent and independent variables. There are two forms of coefficients- standardized and non-standardized. In general, these coefficients are obtained from linear regression analysis as it tends to identify the positive or negative impact of data. According to the above table, there are two positive values of β whereas one value is negative. The positive and negative values denote a positive and negative relationship between variables, respectively. It means that there may a negative relationship between social responsibilities (independent variable) and sustainable supply chain management (dependent variable). On the other hand, the column highlighting t-values can also be examined. For at-value greater than standardized coefficients, it indicates that its regression coefficient is higher which means the value can be hypothesized. Based on Sig. value, β value, and t-value, it can be inferred that alternative hypotheses have been validated.

4.3.3 Pearson Correlation:

Pearson's correlation is another statistical test that measures or predicts a statistical relationship or association between the dependent variable and independent variables. The Pearson correlation coefficient is a number that lies between -1 and +1. The value owed by this coefficient denotes the extent to which two variables are linearly related. Typically, Pearson correlation is analyzed based on R-value and P-value. The results of Pearson's correlation for dependent and independent variables involved in this research are exhibited in the table below.

Correlations

	Environment Management	Health Safety risk mang	Social responsibilities	Sustainable sp
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Environment Management	Pearson Correlation	1	.491**	.339**	.360**
	Sig. (2-tailed)		.000	.000	.000
	N	140	139	138	138
Health Safety risk mang	Pearson Correlation	.491**	1	.456**	.480**
	Sig. (2-tailed)	.000		.000	.000
	N	139	139	137	138
Social responsibilities	Pearson Correlation	.339**	.456**	1	.207*
	Sig. (2-tailed)	.000	.000		.015
	N	138	137	138	136
Sustainable sp	Pearson Correlation	.360**	.480**	.207*	1
	Sig. (2-tailed)	.000	.000	.015	
	N	138	138	136	138

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 5: Pearson's correlation coefficients

Drawing on the above table, an apparent variation between the numerical figures can be seen. The obtained values belong to a range from 0.207 to 1. It has been known that an R-value closer to 1 denotes a positive and strong association between variables. The two Sig. values of 0.000 and 0.015 also coincide with the ANOVA model. According to the findings, it can be inferred that an alternative hypothesis has been selected. Moreover, it is a common estimation that when Pearson's

correlation coefficient owns a value of 1, it is linear. In contrast, when its value is near zero, the relationship will be non-linear. Referring to the above table, the greater values for Pearson's correlation coefficient indicates that each coefficient is positive. In case relationships between variables are shown graphically, a straight line with an upward slope will be drawn.



Chapter 5: Results and Discussion

5.1 Overview

The fifth chapter will state the research results and findings derived from data analysis and evaluation. In the latter part, a discussion will be set out on how the research findings align or contradict with secondary research.

5.2 Results

In the previous chapter, statistical data analysis and evaluation has been conducted through which key research findings have been obtained. Since the dissertation fundamentally revolves around three hypotheses under consideration, the results will be explained accordingly.

The first hypothesis tests a positive correlation between environmental management and sustainable supply chain management. It means that with greater compliance with environment management aspects, the supply chain process will become sustainable and more efficient. In response to the three statements underlying the independent variable, a majority of responses fall under the category of 'agree'. It can be implied that GlaxoSmithKline fulfills the criteria of assessing environmental risks, monitoring different environmental aspects, and recycling of plastic packaging. Thus, in line with data analysis, efficient environment management is achieved.

In the second hypothesis, a positive association between health safety and risk management and sustainable supply chain process is being tested. The three statements related to this independent variable have obtained prominent 'agreement' from employees and management of the company. Drawing on the data analysis, it can be deduced that health and safety laws are complied with, well-maintained machinery is deployed using safety devices, and an effective emergency response plan and evacuation procedure is exercised. Therefore, it can be said that the pharmaceutical company fulfills the criteria of health safety and risk management.

The third hypothesis tests a positive association between social responsibilities and sustainable supply chain management. In response against three statements in the survey questionnaire, it can be observed that the company's employees have largely marked 'agree' and 'strongly agree'. From the data analysis, it can be implied that an effective corporate and social responsibility policy is

exercised and the performance management system is in alignment with social laws and regulations. Moreover, it can also be deduced that the company has the policy to act in the prohibition of child labor, forced labor, and discrimination. Therefore, it has been established that the case company fulfills social responsibilities.

Following key findings, it has been verified that the case company, GlaxoSmithKline PLC, has been successfully executing sustainable supply chain management. On the other hand, the research hypotheses have been successfully tested and are found to be valid.

5.3 Discussion

It is imperative to mention that many prior studies have achieved similar research findings as to the present study. Therefore, the results and findings of the dissertation would align with a great amount of secondary literature.

According to Shah (2004), as the pharmaceutical industry is progressing globally in terms of integration and target markets, the value chains and their interlinked segments are becoming one of the most pressing issues for pharmaceutical firms. The first independent variable, environment management, is a key component in a sustainable supply chain and overall business activities. A study by Sulphery and Safeer (2017) highlighted that this factor takes a review of the manufacturing cycle and caters production areas where high pressure is delivered onto nature. As a result, environmental management has a prominent connection with sustainable supply chain management. Several studies who investigated this connection have noted that environment management adds to sustainability to a greater extent. The more powerful the factor is, the more upgraded will be the sustainable supply chain.

In this study, the second variable is health, safety, and risk management. As elaborated by Glendon et al. (2016), this factor is a combination of health and safety viewpoints merged with identification and assessment of risks. As far as sustainability is regarded, the policies concerned with health and safety are pertinent to the environment also (Mani et al., 2016). Similarly, risk management will be obligated to handle natural risks that may occur across the supply chain.

Coinciding with the research findings, a study by Crane et al. (2019) posits that a sense of social responsibility is cultivated when a firm effectively leads business processes to deal with social

issues. Typically, corporate and social responsibility is not limited to the wellbeing of individuals; rather it considers the duty owed to the planet. One such investigation was led by Quarshie et al. (2016) where the connection between sustainable supply chains and social responsibilities in business was analyzed. Moreover, in another study, similar results were generated.



Chapter 6: Conclusion and Recommendations

6.1 Overview

The last chapter will present the conclusion of the overall study and recommendations for future research.

6.2 Conclusion

The phenomenon of Sustainable Supply Chain Management (SSCM) encompasses the value chain and logistics process which is executed in a way that they exert minimum negative impact over the natural environment. Sustainable supply chains pose several economic, social, and ecological benefits apart from increasing market share for shareholders. In the current times, business markets and industries have been increasingly adopting sustainable practices across their supply chains. The present research intended to examine the sustainable supply chain processes and operations executed by GlaxoSmithKline PLC, a leading international pharmaceutical company. Aligning with the scope of this study, the company's subsidiary in UK has been focused.

Throughout this dissertation, a survey was taken where employees and management executives of the company were engaged. Survey questionnaires were administered to seek their opinions and perception about sustainable supply chain management. In light of data analysis, it has been found that the company fulfills the main factors namely, environment management, health safety, and risk management, and social responsibilities. The results obtained through descriptive and inferential analysis indicate that the majority of respondents support the fact that the supply chain process at the company is sustainable.

6.3 Recommendations

In terms of areas for further academic research, some recommendations have been proposed. Firstly, it would be recommended for future researchers to approach the undertaken dissertation as standard and extend its work by employing a larger sample size. In this way, more generalized conclusions could be reached. Secondly, future students may opt for a survey through the electronic questionnaire method. Conducting a survey over the internet will require less time, as well as its cost, would be reduced. Third, it is suggested to scholars employ other methods for

extracting primary qualitative and quantitative data in future researches. However, the methods must be authentic and reliable. Future research attempts on this subject matter can involve statistical tools other than SPSS. Lastly, it would be interesting to undertake a study that investigates sustainable supply chain management at other pharmaceutical firms. Also, a comparison of sustainable supply chain operations between two companies can be a potential research idea.



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