

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

The effect of sustainable supply chain management practices on sustainable performances of organizations: The case of Large and Medium Food and Beverage Processing Firms in Addis Ababa, Ethiopia

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DECLARATION

I, Yonas Yeshewas, declare that this research paper titled "[***The effect of sustainable supply chain management practices on sustainable performances: The case of Large and Medium Food and Beverage Processing Firms in Addis Ababa, Ethiopia***]" is my own work, conducted under the supervision of Dr. Tariku Jebena. I affirm that the content of this paper is original and has not been submitted for any other degree or qualification at any other university.

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CERTIFICATION

This is to Certify that the thesis prepared by Yonas Yeshewas, entitled: The effect of sustainable supply chain management practices on sustainable performances: The case of Large and Medium Food and Beverage Processing Firms in Addis Ababa, Ethiopia submitted in partial fulfilment of the requirements for the Degree of Master of Arts in Logistics and Supply Chain Management and complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Currently sustainability is a major concern on the local and international levels. The food and beverage processing industries are one of the major sectors that are given significant focus and that are globally facing environmental, social, economic and political challenges. Unlike developed nations in developing countries like ours the understanding as well as implementation of the sustainability concept is considered to be infantile and also the impact that it could have on performance is not well studied. This paper tried to analyze the effect of SSCMP on the sustainable performance in the case large and medium food and beverage processing firms in Adiss Ababa, Ethiopia. Quantitative Research Approach and Cross- sectional descriptive research design was followed in this thesis research. According to Ethiopian national statical agency report in 2018, there are 259 food and beverage processing firms in Addis Ababa, and the sample size was calculated by using Krejcie and Morgan formula. The simple random sampling technique and structured questionnaire was used to collect the data. the findings of this research conclude that green procurement, sustainable packaging, sustainable distribution, and sustainable reverse logistics has a significant and positive effect on sustainable performance of large and medium food and beverage processing firms in Addis Ababa, but according to the results sustainable design has no effect on sustainable performance of large and medium food and beverage processing firms in Addis Ababa, ETHIOPIA. According to this study its recommended companies in the food and beverage industries to focus and work more on green procurement, sustainable packaging, sustainable distribution, and sustainable reverse logistics,

***Key words**: green procurement, sustainable design, sustainable packaging, sustainable distribution, sustainable reverse logistics.*

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ACRONYMS

SSCM- Sustainable Supply Chain Management

SSCMP- Sustainable Supply Chain Management Practice

GSCM- Green Supply Chain Management

ISO- International Organization for Standardization

SCM- Supply chain management

SPSS- Statistical Packages for Social Science

ENSA- Ethiopian National Statical Agency

TBL -Triple Bottom Line (TBL)

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CHAPTER ONE

1 INTRODUCTION

The purpose of the study to assess the effects of sustainable supply chain management practices on sustainable performances: The case of Large and Medium Food and Beverage Processing Firms in Addis Ababa, Ethiopia. This chapter contains the following: the study's background, the problem statement, the hypothesis, the study's objectives, its scope, its limitations, its significance, and its organisation.

1.1 BACKGROUND OF THE STUDY

Supply chain refers to the full process of product or service provision starting from the stage of raw material extraction to the final delivery of end products to consumers, including all the steps that it passes in between. In these processes of converting raw materials into completed goods to successfully and efficiently achieve this goal supply chain needs to effectively coordinate activities like procurement, manufacturing, logistics, distribution and retail. In the processes of optimizing production and delivery of good/services, organizations have for long prioritised increasing firm revenue and profitability while optimising customer happiness. Even though financial gain is important, the processes of production and delivery could be associated with significant environmental, social and economic consequences. So, beyond the basic understanding of supply chain in recent years, a lot of organizations are focusing on SSCMP and implementing it more due to environmental degradation and human rights violations (Oelze, 2017). Sustainable supply chain practices refer to the process of incorporating social, environmental, and economic factors across the supply chain. The goal is to minimize the environmental and social impact of a product throughout its lifecycle while ensuring economic viability Which broadly includes sourcing raw materials responsibly, reducing waste, recycling, green practices and promoting ethical labour practices to insure a sustainable supply chain. Nowadays, both locally and globally, there is a lot of worry about sustainability. Because of its wide scope and relevance to several

specialisations, it is a multidisciplinary problem. "Sustainability is about ensuring that our choices and actions are not only economical but also environmentally and socially responsible. It is the development that meets the needs of the present without compromising the ability of future generations to meet their needs" (WCED, 1987).

The food and beverage processing firms are one of the major sectors that are given significant focus and that are globally facing environmental, social, economic and political challenges (Mastos & Gotzamani, 2022). This could be related to the fact that the food and drinking products provided are more directly related with the health and safety of the consumers. These industries include a wide range of businesses such as agriculture, food processing, catering and beverage manufacturing. This sector is predisposed to change rapidly through time and can be affected by multiple factors like globalization, health and environmental awareness and changes in consumer preference.

Sustainable supply chain practices are widely being implemented in different industries and organizations in developed countries with many existing researches showing their positive impact on sustainability and organizational performance but in developing countries like ours the understanding as well as implementation of the concept is infantile and also the impact that it could have on performance is not well studied (Balda & Singh, 2019). The food and beverage processing firms are one of this sectors that few studies in developed countries show there is a growing need to implement sustainable supply chain management and that it has an impact on sustainability and organizational performance but there are no studies regarding sustainability focusing on the Large and Medium sized food and beverage processing firms in Ethiopia.

The lack of implementation of SSCMP could lead to depletion of natural as well as human resources, have a negative impact on environmental preservation by causing air pollution, water as well as food contamination which could also affect health of every one, there is also unnecessary cost that will be loaded on the firm itself, the suppliers and customers. Considering all this impact, organizations working with food and beverage production could face significant health and safety related pressure from legal and government organizations. This paper tries to analyse the degree of understanding and implementation of SSCMP like green procurement, sustainable product and process

design, sustainable packaging and sustainable Distribution and reverse logistics in large and medium food and beverage processing firms. In addition, this research also tries to find out if, despite suboptimal implementation of this practices in manufacturing industries in Ethiopia (Balda & Singh, 2019) could there still be a positive impact on sustainability performance from the three Triple Bottom Line (TBL) perspective. The research can show the level we are at as an organization and as a country compared to globally competitive organizations. Since it mainly focuses on a rapidly growing, overtly changing and understudied sector like large and medium scale food and beverage industry. this study could bring significant change and also help create awareness on the problems we could be facing by not implementing some of the practices and the social, environmental and economic gains expected to come by implementing it. Finally, I hope this study could also help different large and medium scale companies to reevaluate their structure and impact change.

1.2 PROBLEM STATEMENT

Through time, the needs of human beings are changing and evolving, with that the way manufacturing industries produce goods and provide services to fulfil these needs has also grown complex. While producing goods there are some unwanted environmental and social problems that arise. Over the past twenty years, sustainability has received increased attention because it is a prerequisite for both long-term profitability and the ability of businesses to compete in their respective markets. The concept of SSCMP is still being studied but different studies have shown that the implementation of practices like GSCMP have a significant positive impact on triple bottom line performance (KRHL, 2023), in contrary the impacts of not implementing SSCMP extend beyond environmental concerns and affect the social, economic, and reputational aspects of both the companies involved and the broader community. This includes:

Environmental: Increased carbon foot print, and environmental degradation, affecting ecosystem, and biodiversity.

Communities: local communities may suffer due to social issues like poor working conditions, violations of labour rights, and health hazards associated with unsustainable practices.

Businesses: can face supply chain disruption, reputational damage, loss of customers who prefer eco-friendly and socially responsible products and increased cost if they do not adopt sustainable practices, affecting their long-term viability.

Customers: indirectly impacted through higher prices, as companies pass on increased cost associated with unsustainable practices.

Workers: employees within the industry may face health and safety risks, poor working conditions, and job insecurity if sustainable practices are not implemented.

The majority of nations are concerned about environmental issues, yet large and medium-sized enterprises are growing to meet the demands of free markets by expanding their production capacity. The growth of these sectors also leads to a rise in greenhouse gas emissions, which has an impact on the surrounding community and the environment. In order to avoid all these problems different scholars have tried to study the level of understanding and implementation of SSCMP, what barriers are responsible to make industries not to apply them and what is the relationship with performance of organizations. Most of these studies are done in foreign countries and tend to focus mainly on environmental issues, in Ethiopia the implementation of this concept in different manufacturing industries is minimal and there are no researches concerning this topic. Although most industries might show concern about environmental and social safety, as a business unit they also want to know that there is also economical or financial benefit that comes by implementing SSCMP.

Studies indicate a positive correlation between the performance of firms and Sustainable Supply Chain Management practices, indicating that the community's ability is eventually enhanced by ongoing implementation of sustainable management concepts. An organization's competitiveness is the end outcome of this (Adegoke, 2021). According to a study, Ethiopia has made significant progress in implementing green supply chain management practices, including eco-design, green manufacturing, green packaging,

internal environmental management, and investment recovery. This is evident in the country's leather and leather product industry. However, low-level actions demonstrate green distribution practices, consumer collaboration, and reverse logistics practice (Worku, 2019). The study's conclusions showed that, despite the research's narrow emphasis on the leather and leather product industry, green supply chain management practices have little impact on the businesses' operational and environmental performance.

Two aspects of the green supply chain green purchasing and eco-design were not found to be correlated with environmental performance, according to a study on small and medium-sized businesses in South Africa (Epoh & Mafini, 2018). Green design and manufacturing have been found to have positive and significant effects on three categories of outcomes in another study conducted in Vietnamese construction materials manufacturing enterprises. On the other hand, green procurement has been found to have an impact on social and economic performance but not on environmental performance. A favourable correlation between green distribution and environmental performance, which is unsupported from an economic and social standpoint, is also empirically demonstrated by the results (Le, 2020). Similar to the other sectors previously discussed, the food business is distinguished by improved supply chain connections that strive for superior sustainability performance (beske, 2014). Sustainable packaging and environmentally friendly purchasing lead to better economic and social performance, and there is a correlation between financial and social performance in corporations (waddok, 1997). An additional investigation within the wine sector found that employee practices related to social sustainability result in reduced costs (Thach, 2002); However, (Pullman, 2009) highlights “the complexity of sustainability impacts on performance and suggest that performance benefits from sustainability programs may be difficult to recognize”.

These are examples that can show the existing variation in extent of implementation of SSCMP and their relation with Sustainable Supply Chain performance in different industries. The existence of this variations suggests there is still a need for further study in order to fill the gaps and result in a better understanding of the issue. Even though the food and beverage processing firms specially deserve more focus and understanding as

discussed above, there are only few studies in Ethiopia which are mainly focused on one organization/factory rather than the broad industry like (Mulugeta, 2021) and (Nigatu, 2020).

A study done at Addis Ababa abattoirs enterprise shows that the supply chain management practice dimension's mean score value was lower than the industry average (only ranging from 2.32 to 2.49), which strongly suggests that the industry's supply chain management is inefficient. Additionally, a positive correlation between the five elements of supply chain management practice was discovered by the study (Hailu, 2019). In Contrary to this Another study in BGI Ethiopia documented that the company is making an attempt to participate in the green manufacturing system, despite the fact that green procurement practices are quite rare. The presence of sustainable supply chain management strategies and competitive pressure emerged as the most influential facilitators, although government incentives are thought to be minimal. However, the responses to the problems of implementing GSCM were dominated by the absence of customer collaboration and cross-departmental communication (Goffere, 2021).

The study conducted on the Coca-Cola Beverages, Africa, Addis Ababa Plant found that although there is still room for improvement in the areas of green distribution, green procurement, and reverse logistics, the state of green supply chain management is now performing better in the green manufacturing practice aspects. According to several research, implementing environmentally friendly supply chain practices depends heavily on the dedication and fervent support of management and employees.

Even though there are few researches on food and beverage processing firms in Ethiopia, most of them tend to agree on suboptimal implementation of SSCM practices and low environmental and social performance pertaining to different barriers mentioned above. But, there are no researches done in our country that analyse the effects of sustainable supply chain management practices of organizations on sustainable performances in Large and Medium food and beverage processing firms in Addis Ababa. Since the industry is rapidly growing and evolving sector that is not significantly affected by recessions, it’s expected to get different analysis results on this topic from the time the above studies were done. In addition, the industry is given a lot of focus from customers

as well as government officials because it is directly related to the wellbeing and safety of consumers, so showing where we stand in comparison to the globally competitive market and evidence-based benefit of caring out environmental, social and financial responsibilities, the author can indirectly help improve societies safety and health for the future. It's also the authors believe that this study could give a new Insite, add to the knowledge and practice of students, researchers and company managers.

1.3 RESEARCH OBJECTIVES

1.3.1 GENERAL OBJECTIVE

The general objective of the study is to assess the effect of sustainable supply chain Management practices on the sustainable performance in the case large and medium food and beverage processing firms in Adiss Ababa, Ethiopia

1.3.2 SPECIFIC OBJECTIVES

The specific objectives of the study are:

1. To assess the effect of green procurement on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.
2. To determine the role of sustainable design on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.
3. To assess the effect of sustainable packaging on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.
4. To determine the effect of sustainable distribution on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.
5. To determine the effect of sustainable reverse logistics on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.
6. To assess the practice of sustainable supply chain management in large and medium food and beverage manufacturing companies in Addis Ababa.

1.4 HYPOTHESES OF THE STUDY

H1. Green procurement has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.

H2. Sustainable design has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.

H3. Sustainable packaging has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.

H4. Sustainable distribution has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.

H5. Sustainable reverse logistics has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.

1.5 SIGNIFICANCE OF THE STUDY

The study would help understand where we stand on the extent of implementation of SSCMP compared to other cities as well as countries, since the level of awareness about this topic in our country is very young and there are only few studies on this area that also show inadequate implementation of some of the main Sustainable SCMP. Considering the food and beverage industry is rapidly growing in developing countries like ours and since the goods they provide are directly related with the health and safety of consumers knowing the level of implementation of the sustainability practices is vital. Doing this study by focusing on this sector helps to add new and current perspective to the way we think about our industries and also help us compare our practises to the international market and encourage improvements for a better future. Also, by showing the relationship between some of the SSCMP and performance, it helps to show managers and owners of different industries what areas they need to focus and work on in order to achieve success and profit without compromising environmental and social resources. In

addition to adding to the knowledge of workers, industry owners and students studying in this area and benefiting companies' profitability, it also recommend ideas for better further research by stating the limitations of this study.

1.6 SCOPE OF THE STUDY

The topic of this study focuses on identifying the effects of Sustainable SCMP in Large and Medium Food and Beverage processing firms in Addis Ababa and also the relation with Sustainable performances. It is good that the research scope includes all dimensions of sustainable performance and the practices on the major steps of supply chain management but as we know supply chain contains supplier, the firm and customer, this study focus is limited to the firm. Questioners only provided to the firm managers and employees who has been working in the firm above five years, but not to suppliers or customers. The research is a quantitative cross-sectional study which is the better method to follow to achieve the Setout objectives. The study area is chosen to be only in Addis Ababa because it is the capital city of Ethiopia and has the predominant number of industries compared to all the other regions and also convenient to the researcher. The study population was limited to the food and beverage industries since this sector had the highest number of organizations compared to the other categories that are stratified by the Ethiopian National Statistics Agency (ENSA).

1.7 LIMITATION OF THE STUDY

The sample industries are in one category which was the food and beverage industry and the study area is also geographically limited to one city (Addis Ababa) so the researcher cannot conclude for all industries in Ethiopia and the study period is also limited. It would also be better for further researches to include suppliers and customers perspectives and do it in all the industries.

1.8 DEFINITION OF KEY CONCEPTS AND TERMS

Performance: The execution or accomplishment of task, activity, or function, often measured by the effectiveness, efficiency, or quality of the outcome.

Sustainability: the process of managing supply chain activities while taking social, environmental, and economic factors into account.

Sustainable Supply Chain Management: refers the methodical planning, coordinating, and optimizing of all tasks related to the distribution, production logistics, sourcing, and purchase of goods.

Sustainable performance: To ensure ethical and responsible operations that benefit current and future generations, it entails incorporating environmental, social, and economic factors into corporate procedures.

Sustainable supply chain management practice: it encompasses various aspects, including green procurement, sustainable design, sustainable packaging, sustainable distribution, and sustainable reverse logistics, together those practices contribute to a more sustainable supply chain by reducing environmental impact, enhancing social responsibility, and supporting economic viability.

Food and beverage industry: businesses such as agriculture, food processing, catering and beverage manufacturing.

1.9 ORGANIZATION OF THE STUDY

There are five chapters in the study. Chapter One is devoted to the Introduction, which covers the following topics: study background, problem statement, hypothesis, aims, importance, delimitation, and operational definition of words. The review of relevant literature, including an introduction, a theoretical and empirical review, a research gap analysis, and a conceptual framework, is covered in Chapter two. The study approaches, research design, population and sample, data sources and collection techniques, data

analysis technique, validity and reliability, and ethical considerations are all covered in chapter three. In Chapter 4, the study's results are compiled and interpreted, along with some discussion. Chapter Five concludes with four sections that contain recommendations for further research, conclusions, and a summary of the findings.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 REVIEW OF THEORETICAL LITERATURE

2.1.1 THE CONCEPTS AND THEORIES OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES

Supply chain Management (SCM)

Supply Chain Management (SCM) is a complex field with various Perspectives. Different authors may emphasize different aspects, but in general, SCM involves the coordination and integration of activities, processes, and information across the entire supply chain to create value for the end customer. Planning and managing every aspect of sourcing, procurement, conversion, and logistics management is what the Council of Supply Chain Management Professionals (CSCMP) defines as supply chain management (SCM). Meeting the actual demands of the client also entails designing and overseeing the implementation of smooth, value-added procedures that cut across organisational boundaries. In order to deliver a final product to the end-user or client, a complex network of operations must be coordinated and managed, according to Kim & Rhee (2012).

Sustainable Supply Chain Management (SSCM)

Sustainable supply chain management is an evolving concept that reflects a growing emphasis on environmental, social and economic responsibility in supply chain practices. When the three aspects of the triple bottom line economic, social, and environmental are taken into consideration, "green" supply chains—also known as sustainable supply chain management evolve. There has been a rise in research articles on the subject, covering both quantitative and qualitative analysis. Leading authors in this new and developing discipline, like Carter et al. (2019) and Dubey et al. (2017), have made contributions. A

world-class sustainable supply chain management approach with six key components has been presented by Dubey et al. (2017): environmental, social values and ethics, economic stability, operational performance assessment, internal and external variables.

Resource based view (RBV) has received significant attention in explaining supply chain management practices (Barney & Clark 2007). In the realm of SSCM, this theory underscores the strategic significance of sustainable practices such as eco-friendly sourcing, waste reduction strategies, and efficient logistics. These practices not only contribute to reducing operational costs and enhancing efficiency but also align with increasing consumer and regulatory demands for environmental responsibility (Barney, 1991; Sarkis, 2012). By leveraging these internal resources effectively, food and beverage processing firms in Addis Ababa can potentially achieve sustainable competitive advantage by differentiating their products and improving their overall environmental performance.

TCT, on the other hand, focuses on the costs associated with transactions between firms within a supply chain. Within the context of SSCM, firms may adopt sustainable practices to mitigate transaction costs related to environmental risks, regulatory compliance, and stakeholder relationships (Williamson, 1985). For instance, establishing long-term relationships with sustainable suppliers can reduce uncertainties and costs associated with supply chain disruptions or reputational risks due to environmental non-compliance. By minimizing these transaction costs through SSCM practices, food and beverage processing firms in Addis Ababa can enhance supply chain efficiency and achieve more sustainable performance outcomes over time (Carter & Rogers, 2008).

Sustainable Supply Chain Management Practices

Sustainable supply chain management is developed through the application of sustainable supply chain management practices. Compared to traditional purchasing and supply management methods, SSM practices provide a broader perspective by accounting for both social and environmental value in addition to economic ones. This will make it possible for the organisation to profitably and sustainably accomplish its overall goals (Giunipero et al., 2012).

According to Dabhilkar et al. (2016) and Pullman et al. (2009), a company's sustainability practices are an expression of its capacity. Certain academic works (Kilubi & Rogers, 2018; Reuter et al., 2010) have also referred to SSM practices as an enterprise's dynamic capability. Methods of sustainable supply chain management. The definition of SSCM serves as the foundation for the defining of Sustainable Supply chain Management practices.

2.1.2 THE CONCEPTS AND THEORIES OF ORGANIZATIONAL SUSTAINABLE PERFORMANCE

Enhancing Environmental, Social, and Economic Performance is the primary goal of SSCM. Sustainable Performance is referred to as a "firm's performance regarding environment and society" by Gualandris et al. (2014). Sustainable supply chains help organisations to achieve their goals of broadened performance conceptualization, which goes beyond standard measurements of revenue and cost to incorporate social and environmental elements.

The process of integrating sustainable development objectives, such as social justice, economic efficiency, and environmental exposure, into the working environment of enterprises is known as organisational sustainability (Varsei et al., 2014). As a result, in the manufacturing industry, sustainability refers to the fundamentals of ecologically friendly goods and services.

Integrating sustainable development objectives, such as social justice, economic efficiency, and environmental performance, into corporate procedures is one instance of organisational sustainability (Varsei et al., 2014). In contrast, "adopting organisational strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future" is what is meant to be understood when discussing organisational sustainability.

In order to achieve sustainability, organizations must meet customer requests and needs, improve product quality, maximise profits, and address social and environmental issues (Barbier, 2007 & Hunt, 2011). Making responsible use of natural resources is part of

environmental commitment; creating value and profit is part of economic commitment; and charitable giving, social interaction, and support for education are parts of social responsibility.

2.2 MEASUREMENTS OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES

Wang & Dai (2018) has used sustainable packaging and sustainable design dimensions to operationalized SSCM practices, whereas, Fu, L., et. al. (2023) has used green procurement and sustainable design dimensions to operationalized SSCM practices. And also, Balda & Singh (2019) has used green procurement, sustainable design, sustainable packaging, and sustainable distribution dimensions to operationalized SSCM practices. and Epoh & Mafini (2018) has used green procurement, sustainable design, and reverse logistics dimensions to operationalized SSCM practices.

2.3 GREEN PROCUREMENT

The initial phase in implementing green supply chain management is green purchasing (Le, 2020). It entails working with suppliers to achieve environmental goals and making purchases of eco-friendly goods. It alludes to the process of working together with suppliers to create environmentally friendly products. A green supply chain's sourcing process is essential, i.e. One of the most crucial elements of a green supply chain is the use of sustainable purchasing practices (Varnas, 2009).

Buying firms need to collaborate on information exchange, joint research, and training in order to satisfy suppliers' environmental goals (Laosirihongthong et al., 2013). According to Esfahbodi et al. (2016), and Laosirihongthong et al. (2013), suppliers must hold ISO14001, ISO9001, or EMS certification in order for environmental integrations to be incorporated into the procurement stage. During the selection process, the green parts of the project are assigned to suppliers by giving them eco design specifications that contain

environmental standards for acquired items (Esfahbodi et al., 2016). The promotion of recycling, reuse, and resource conservation are other features of green shopping.

2.3.1 SUSTAINABLE DESIGN

It is composed of practices for creating goods that: reduce the risk to the health of the customer; are simple to assemble; include less hazardous and more environmentally friendly materials; and use less energy to operate. Its design objectives are to use as little energy and material as possible, to make it easier to reuse, recycle, and recover component materials and parts, and to utilise fewer or no hazardous products during the production process (Zhu et al., 2008).

Products should be developed using environmentally friendly raw materials, parts, and components to reduce energy consumption, emissions, and the production of solid and liquid wastes during supply chain operations, such as manufacture, transportation, storage, and usage (Zhu, 2005). The decisions taken during the design phase have a significant influence on the post-use disposal of a product. This suggests that a product's original design has a significant impact on its disposal, recycling, remanufacturing, and repurposing. Optimising long-term sustainability can also be achieved by integrating supply chain process design phase with life cycle assessment principles.

Baojuan (2008) asserts that recycling is an additional industrial activity that facilitates the expansion of sustainable supply chain management and aids businesses in enhancing their public perception of their environmental practices.

By utilising lean manufacturing processes, quality, and cleaner process technologies, a sustainable supply chain increases efficiency and reduces waste and byproducts. Pollution and inefficiency are closely related. The trash from industrial businesses is a source of pollution due to inefficient production methods and material usage. Green (2012) asserts that companies are currently facing challenges in substituting ecologically friendly and renewable energy sources like solar and wind power for non-renewable ones like coal, oil, and natural gas.

2.3.2 SUSTAINABLE PACKAGING

If not adequately managed, packaging materials can include wood, metal, glass, plastic, and paper then they can contribute to the waste stream. In a supply chain that includes purchasing, manufacturing, warehousing, shipping, retailing, and materials handling and inbound logistics operations, packaging is crucial (Verghese & Lewis, 2007). Packaging plays a crucial role in establishing and maintaining relationships with customers, influencing their decisions to buy, promoting products and brand values, and setting a product or business apart from rivals. By successfully containing and safeguarding goods as they move through the supply chain, sustainable packaging truly benefits society. It is made of materials that are continuously recycled, does not endanger human health or ecosystems, and is engineered to use resources and energy efficiently.

2.3.3 SUSTAINABLE DISTRIBUTION

One of the primary causes of environmental issues is thought to be distribution (European Commission). Greenhouse gases, which include carbon dioxide (CO2), methane (CH4), and nitrogen oxide (N2O), are mostly produced by transportation-related equipment and are responsible for global warming. Logistics systems inherently involve transportation. In this sense, the goal of sustainable distribution is to reduce the environmental effect of moving raw materials and finished goods along the supply chain. When creating sustainable transportation systems, several aspects such as fuel sources, modes of transportation, infrastructure, and operational and managerial procedures should be taken into account. In order to assure sustainability, Bortolini et al. (2016) assessed the food industry's distribution network based on delivery time, carbon output, and operation cost. The outcome demonstrated how this kind of distribution network planning lowers waste expenses and carbon emissions. Through a sustainable distribution process that includes shorter movements, efficient use of space, and direct routes, sustainable procurement helps reduce waste and emissions of CO2, which is beneficial for the environment and helps lower the costs of the businesses (Khanam & Ghosh, 2022).

2.3.4 REVERSE LOGISTICS

Reverse logistics involves returning goods or products from customers to earlier points in the supply chain, aiming to recycle, reuse, remanufacture, repair, refurbish, or ensure safe disposal (Seroka, 2014). Existing research indicates that reverse logistics operations encompass activities such as product returns, remanufacturing, recovery, recycling, reuse, and redistribution. reverse logistics is crucial for increasing an organization's operational effectiveness, competitiveness, and cost-effectiveness across. Reverse logistics network greening is regarded as a strategic technique since it can boost organizational competitiveness and yield significant financial rewards (Buyukozkan & Cifci, 2012). Thus, the goal of reverse logistics is to increase organizational performance and save costs by encouraging the reuse or resale of products in order to make up for lost revenue and lower operating expenses.

2.4 MEASUREMENTS OF ORGANIZATIONAL SUSTAINABLE PERFORMANCES

Adegoke, I., et. al. (2021), Emamisaleh, K., et.al. (2018), KRHL, G., et. al. (2023), and Le (2020) have used environmental performance, social performance, and economic performance dimensions to operationalized SSCMP.

2.4.1 ECONOMIC PERFORMANCE

A business's economic or cost performance refers to how efficiently it manages finances considering the savings from adopting green practices. This efficiency can be observed in areas such as material and energy consumption, waste disposal, essential maintenance, and penalties for environmental incidents. According to Zailani et al. (2012), Green et al. (2012), Das (2018), and others, economic performance include cost reductions in areas like material purchases, energy usage, waste treatment costs, waste disposal fees, and decreased fines for environmental incidents.

2.4.2 SOCIAL PERFORMANCE

Organizations and businesses all throughout the world have been forced to focus on social responsibility in recent years due to organisations and social developments, and society now needs to approve of the actions that firms take. Because of this, companies are realising more and more how important stakeholder connections are to maintaining their long-term survival (Yildiz¸ ankaya & Sezen, 2019). Increasing organizational awareness of health, safety, and education has heightened the focus on social performance in supply chain management (Seuring & Muller, 2008). SSCM seeks to enhance supply chain firms' social. Nonetheless, the majority of SSCM focused empirical research focuses on the economic and environmental sectors. According to Mani et al. (2016), there aren't many empirical research on social sustainability in supply chain management. The expansion of healthcare facilities inside the community is a key indicator of social performance, according to Das (2018), enhancing job and economic prospects for the community is another way that social performance is represented. Conversely, several studies by Zhu et al. (2016) and Das (2018) have supported the advancement of vocational and primary education for the surrounding population.

2.4.3 ENVIRONMENTAL PERFORMANCE

Environmental performance is the capacity of the organization to minimize air, liquid, and solid waste; decrease the use of poisonous and hazardous products; and lower the number of environmental mishaps. the benefits of SSCM practices on the environment, both inside and outside the business, are included in environmental performance results. environmental performance has recently emerged as a source of sustainable organizational performance and competitive advantage. Kumar (2012) defines environmental performance as the measurement of reduced chemicals and pollutants to mitigate the environmental impact caused by corporate organizations. Zhu, Tian, and Sarkis (2012) suggest that environmental performance is frequently evaluated based on reductions in air pollution, energy consumption, hazardous material usage, and overall material use.

A company's environmental Performance is determined by how well its operations minimize negative impacts on the environment. Sustainable supply chain management practices encompass all efforts to mitigate the negative environmental impacts of a company's products or services. Initiatives such as reducing the use of hazardous materials, minimizing waste, decreasing environmental accidents, and enhancing community health can contribute to improved environmental performance (Eltayeb et al., 2011). integrating green practices was the most efficient strategy to minimize waste in large and medium-sized organizations. Overall, research indicates that adopting eco-friendly methods improves performance by lowering energy and material consumption, waste disposal, and other related.

2.5 REVIEW OF EMPIRICAL LITERATURE

2.5.1 SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES IN FOOD PROCESSING AND BEVERAGE FIRMS

An organization's supply chain can be effectively managed by implementing a set of principles known as sustainable supply chain management. These procedures cover the social, economic, and environmental duties that businesses must carry out in order to maintain and enhance their triple bottom line performance metrics. The process of locating, processing, and distributing ingredients and raw materials to consumers is known as the food and beverage supply chain. Many parties are involved, such as producers, processors, distributors, merchants, and end users.

Effective supply-chain management is the cornerstone of successful food and beverage manufacturing because it allows businesses to quickly communicate their demands to their suppliers in response to changing demand (new food trends, evolving customer tastes, etc.). Manufacturers of food and beverages also depend on their supply chains to assist in managing the risks associated with food safety and regulatory compliance. Operations throughout the supply chain can quickly deteriorate, endangering quality, profitability, and lives, unless there is a strategic focus on supply-chain management and

collaboration and the tools, best practices, and systems to support that focus (e.g., ERP, CRM, and BI solutions) (Brandt, 2009).

A strategic emphasis on supply-chain management, supported by collaboration and the necessary resources, best practices, and systems like ERP, CRM, and BI solutions, is crucial. Without these elements, operations across the supply chain can deteriorate rapidly, jeopardizing quality, profitability, and potentially lives (Brandt, 2009).

Globalisation, rising demand, and market integration are some of the internal and external factors driving workers in the food chain system in the modern era towards more sustainable practices (Hubeau et al., 2017). These practices include customer satisfaction, resource efficiency, product safety, innovation, dependability, company information, packaging, and waste management.

Different green supply chain strategies are used by companies in the food and beverage industries based on the activities they carry out and which strategies would increase their competitiveness. Additionally, it was shown that the majority of the companies' green supply chain initiatives included purchasing, monitoring, environmental cooperation, and greening the production stage (Onyinkwa, 2016).

Another indication of the power of consumer expectations to incentivize supply chain sustainability came from a PRISM survey conducted among 300 US consumers. Companies should "improve their environmental and labour practices, even when it results in more expensive products," according to 67% of respondents who agreed or strongly agreed with this statement. About 40% of respondents disagreed or strongly disagreed that "most food and beverage companies have responsible environmental and labour practices" when asked directly about the food and beverage industry (PRiSM, 2006). This survey also demonstrated the discrepancy between what consumers believe to be the food and beverage industry's performance and their expectations

Numerous studies have supported the adoption of sustainable supply chain strategies, such as green procurement and sustainable design, by demonstrating their advantages. The author has discovered a new set of cutting-edge SSCM techniques, such as daily conversation, local sourcing, and HR investments, based on study done on the Greek food

business. The study also noted that a lack of knowledge regarding the most effective way to apply sustainable practices is one of the obstacles to successfully adopting these practices (Mastos, 2022).

Research conducted in Addis Ababa, Ethiopia, on the bottled water industry revealed that the industry's GSCM practices are comparatively robust. In terms of the correlation, it shows that supplier reluctance and economic factors are highly correlated with reverse logistics, while economic factors and resistance to technology, lack of organisational encouragement, cost implications, and low quality human resources are strongly or highly correlated with the practice of green manufacturing (Nigatu, 2020).

2.5.2 Supply Chain performances of Food Processing and Beverage Firms

Manufacturing businesses that produce food and beverages heavily depend on other businesses operating in the same industry. For a manufacturing company to work together and meet client requirements more effectively and efficiently than its rivals, performance assessment is crucial (Cagno et al., 2019). Manufacturing companies could use performance metrics, such as transit time, cost, dependability, flexibility, quality, and sustainability, to make quick purchase decisions (Islam et al., 2013). The majority of manufacturing sectors are constantly under pressure to increase productivity (Subramaniyan, 2015). In order to improve the firm's performance sustainability, internal stakeholders must be aware of when particular measures might be implemented (Cagno et al., 2019). In these situations, manufacturing companies coordinate with other companies to obtain the production orders. These partnerships are effective when suppliers and manufacturers in the same production line are mapped out. Businesses that manufacture beverages primarily rely on stable supply chains, established agreements with vendors, and precise information and data transfer for management decision-making. Manufacturers gain from information sharing with suppliers because it improves supply chain partners' responsiveness, improves measurement, helps define critical metrics and boosts productivity, customer service, and overall business performance. Putting strategies into practice is a necessary step in the strategic management implementation

process. When engaging with suppliers, food and beverage manufacturing companies need to adapt to various inventory situations, including perishable goods, special sales, shortages, and fluctuating demand, which can change over time (Nagib et al., 2016). But Kashmanian et al. (2014) go on to say that suppliers that work with several clients might also need to start a number of supplier codes of conduct that// they have to abide by. The Coca-Cola Company ensures ethical sourcing of agricultural goods by collaborating closely with its suppliers. To help the growers of these ingredients, they have developed a set of Sustainable Agriculture Guiding Principles (SAGP) (Kashmanian et al., 2014). The corporation, which has a global presence, uses the SAGP to make sure that manufacturing continues uninterrupted as a cost-cutting measure and that the company's gross profit margin grows consistently. As for manufacturing companies, they stand to gain from lower inventory-related expenses as a result of replenishment policies and minimum and maximum stock requirements (Oláh et al., 2017). In order to obtain a competitive edge, companies should manage their supply chains efficiently and put cost-cutting measures into place that give priority to quality, cost, flexibility, delivery, and innovation as the primary business drivers (Fawcett, Ellram, & Ogden, 2007). The integration of warehouses facilitates the fulfilment of demand from an alternate warehouse in the event of problems at a designated warehouse (Singh et al., 2021).

2.5.3 The role of Sustainable Supply Chain Management practices in Sustainable performances in Food Processing and Beverage Firms

The effect of SSCMP in sustainable performance has been studied in many different industries and facilities but only few account for the food and beverage industry in general. Although most studies focus on improving environmental performance, practices that could also improve social and financial performances are also point of interest for consumers as well as the processing firms. A study done in Kenya food and beverage processing sector concluded green purchasing leads to a higher performance and recommended that these sectors should embrace it to improve their performance (Bor, Ngugi & Odhiambo, 2019). A different study on the effect of green supply chain management techniques on the competitiveness of companies in the food and beverage

industry that was carried out in Kenya came to the conclusion that these practices benefit these companies. In order to give food and beverage companies a competitive edge over their rivals, the report suggests that green supply chain management techniques be incorporated into their long-term business plans.

Other studies, in addition to those focusing on green supply chain management, distinguish between internal and external SSCM practices and examine the connection between internal SSCM practices and organisational performance across three dimensions. According to a study conducted in Thailand by Kuwornu (2022), internal SSCM practices, such as general environmental management, environmental protection management, food safety management, and social services and philanthropy, have been shown to positively correlate with environmental, financial, and social performance. In contrast, sustainable packaging has been found to negatively correlate with all three dimensions of sustainable performance.

Conversely, most external sustainable supply chain management (SSCM) practices exhibit a positive relationship with social, economic, and environmental performance, except for monitoring individual suppliers and joint development with partners in the supply chain, which showed a negative relationship with all three dimensions of sustainable performance. This can be attributed to the costs and environmental impacts associated with packaging materials commonly used in food and beverage handling.

In most of the researches reviewed there is a common finding that suggests a positive relationship between SSMP and organizational performance like research done within the beverage industry sector in south Africa following a quantitative cross-sectional study design that concluded that environmental performance improvement has an influence on supply chain performance which supports many previous researches. Another study on the role of traceability and transparency in effective supply chain management practices in the food and beverage industry Successful supply chain management practices in the food and beverage industry are heavily dependent on traceability and transparency. These practices also contribute to regulatory compliance, quality control, consumer confidence, and product safety, all of which have a knock-on effect on performance (Singwal, 2021).

In contrary there are some researches that show objectively supported concern for poor economic performance following implementation of some practices. The food industry in Iran was the subject of a study that revealed the costs and potential risks associated with acquiring organisational resources such as knowledge sharing, marketing capabilities, and innovation. As a result, sustainable economic performance cannot be achieved through supplier development, accurate assessment based on sustainability indicators, or knowledge improvement throughout the supply chain. which can be brought on by the expenses of managing and evaluating suppliers (Emamisaleh, 2018

In the area of restaurant businesses, According to a study, green suppliers and their GSCM practices play a significant influence in promoting ethical attitudes in restaurants, which in turn helps those restaurants collaborate with those suppliers for improved environmental performance. It did, however, also indicate that internal GSCM had no such effect and that only external GSCM from suppliers was found to significantly increase restaurant ethical attitudes. Furthermore, Shin (2022) found that two of the three cooperative behaviour dimensions "information sharing" and "flexibility in arrangement" had a major positive impact on the environmental performance of restaurants.

In Ethiopia there are few studies focusing on these industries and they tend to focus on one category or firm. According to Hailu's (2019) study, the enterprise's sustainable supply chain performance is greatly impacted by supply chain management practices such as information sharing, customer relationship management, suppliers' management, supply chain responsiveness, and supply chain collaboration. The study focused on the assessment of fresh meat supply chain management practices at Addis Ababa abattoirs. The aforementioned publications indicate that there is a dearth of research that has attempted to evaluate the relationship between SSCM practices and all three performance characteristics, particularly in Ethiopia.

2.5.4 SUMMARY OF GAPS IN THE EMPIRICAL STUDIES

Understanding the relationship between implementing SSCMP and sustainable social, environmental and economic performance is very important to insure companies' competitiveness and society's safety. Prior research has mostly focused on economic and environmental effects, as studies by Vinzi (2012) and Green (2012) demonstrate. Few papers have considered all three dimensions of sustainability performance economic, environmental, and social simultaneously (Wang & Dai, 2018). Although most studies show positive relation between implementation of the different practices and sustainability performance there are a few contradictory results that put different factors as mediators and reasons for the existing variations. For instance, a study on Bangladeshi manufacturing enterprises found a favourable correlation between two aspects of sustainable supply chain practices: investment recovery and sustainable procurement. However, cost performance suffered as a result of sustainable distribution. Furthermore, cost performance was unaffected by sustainable manufacturing (Khanam, 2022). According to an analysis of Vietnamese construction material manufacturing companies, three categories of results were positively and significantly impacted by green design and green manufacturing. Green purchasing, however, had little effect on environmental outcomes. Although this association was not substantiated from an economic and social standpoint, the study also empirically showed a favourable relationship between green distribution and environmental performance (Le, 2020).

According to a different study on micro, small, and medium-sized businesses (MSMEs) in Indonesia, GSCM practices significantly impact the environmental performance and operating expenses of MSMEs in the food and beverage sector (Dinda, 2022). A study conducted on Sri Lankan garment manufacturers revealed that while business size and length moderate the abovementioned relationship, GSCM techniques have a beneficial impact on the organization's triple bottom line (Susitha, 2023). The disparities between the results of various research beg the questions of what caused these differences and what elements might assist businesses in improving their triple bottom line performance. This study attempts to provide an answer to this query in a field that is broad and closely tied to the health and safety of its clients.

There are also studies demonstrating that certain practices have greater impact than others, with the addition of moderating factors. Das (2018) demonstrated that operational components, supply chain coherence, employee attention, and social and environmental indicators are sustainable management dimensions of the supply chain that can help to improve various aspects of the organization's performance in relation to sustainability. This is similar to the meta-analysis conducted on the impact of green supply chain management (GSCM) on enterprise environmental performance (EEP), which revealed that GSCM has a moderate positive impact on EEP. Furthermore, all dimensions of GSCM positively influence EEP, with internal environmental management having the most significant effect.

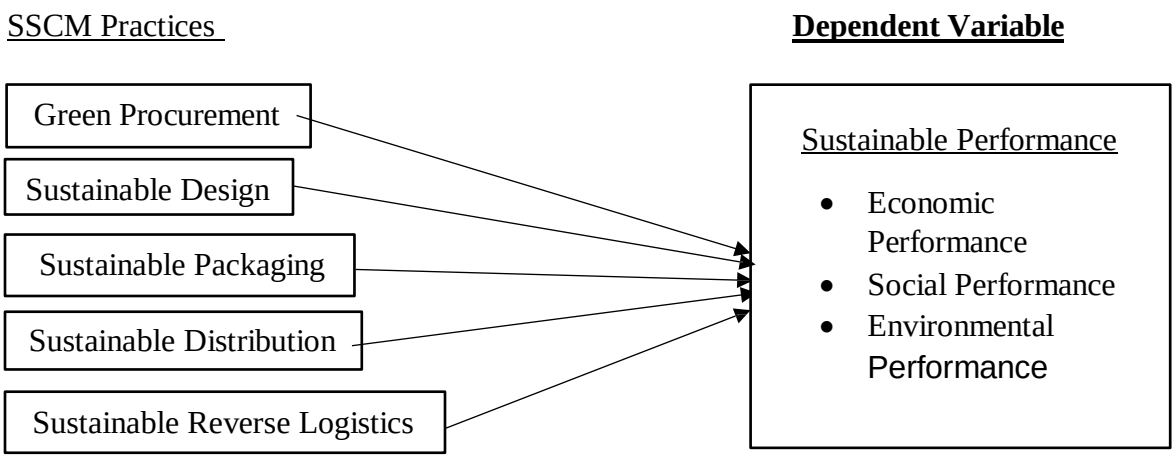
The food and beverage industry are not as intensely studied as its abundance globally, but there are some studies regarding sustainability in these sectors, like the study done in Iran food industry shows SSCMP have impact on TBL. To enhance sustainability performance in the supply chain, it is necessary to enhance sustainable supplier management techniques, sustainable operations management practices, and sustainable customer management practices, according to the research's findings (Imamisalah, 2018). Another assessment of the research on small and medium-sized food retail businesses (SMEs) in the UK found that important external pressures (EP) and internal drivers (ID) encourage organisations to start GSCM practices. Although the claim that ID influences GSCM practices is strongly confirmed by empirical evidence, there is no discernible relationship between EP and GSCM practices. Research has also demonstrated that implementing GSCM can enhance profitability, efficiency, and brand image (BI), all of which contribute to an overall improvement in the performance of the company (Ali, 2017). Research on SSCM in Ethiopia often consists of case studies that concentrate primarily on specific enterprises or organisations. According to a study, Coca-Cola Beverages Africa (CCBA) in Addis Ababa is an excellent example of a company that uses green manufacturing techniques. The survey also found that the company's biggest implementation obstacles for GSCM are limited technology and a lack of assistance from the government. In contrast to earlier research, the CCBA plant in Addis Ababa does not have an awareness gap or a lack of dedication and support from top management (Mulugeta, 2021).

According to another study on the Addis Ababa bottled water sector, GSCMP are especially robust. The study discovered that the practice of green manufacturing is substantially or highly connected with economic issues, opposition to technology, a lack of organisational motivation, cost implications, and poor quality human resources. Reverse logistics is also strongly associated with economic considerations and supplier resistance (Nigatu, 2020).

There have been no studies in Ethiopia focusing on the food and beverage industries that analyze both the implementation of SSCMP and their relationship with sustainable performance. Therefore, this study could offer a new perspective and understanding on the topic that may stimulate companies to improve their structures and systems for a better future. It could also serve as a starting point for further research in the area.

2.6 CONCEPTUAL FRAMEWORK

The conceptual framework of this study consists of five independent variables and one dependent variable. The independent variables include green procurement, sustainable design, sustainable packaging, sustainable distribution, and sustainable reverse logistics, while the dependent variable is sustainable performance.



Source: Source: Adopted from Le (2019) and modified by the researcher

Figure 1: conceptual framework

CHAPTER THREE

3 RESEARCH METHODOLOGY

3.1 DESCRIPTION OF THE STUDY AREA

According to Ethiopian national statistical agency (ENSA) about 39% of manufacturing industries are located in Addis Ababa, which is close to 1430 industries. This publication also reports that over 298,510 people were engaged in all the manufacturing industries that were surveyed during this period. Out of those industries there are 259 food and beverage industries in large and medium scale in Addis Ababa. The study was taken from the sample frame chosen which includes the 259 manufacturing industries in the food and beverage processing firms in Addis Ababa.

3.2 RESEARCH PARADIGM, APPROACH AND DESIGN

3.2.1 RESEARCH PARADIGM

A research paradigm is a collection of shared assumptions and opinions among scientists regarding the proper ways to see and approach problems (Kuhn, 1970). The constructivism or interpretivism paradigm, the positivist paradigm, and the pragmatic paradigm are the three most prevalent paradigms. Positivism Paradigm was followed in this research. The positivist paradigm is a school of philosophy that emphasises the value of objective observation, scientific procedures, and empirical data in the search for knowledge. The positivist paradigm provides a solid philosophical foundation for quantitative research, guiding as in our approach to generating empirical knowledge though systematic observation, measurement, and analysis. By adhering positivist principles, the researcher produced rigorous, reliable, and generalizable findings.

3.2.2 RESEARCH APPROACH

A research approach refers to the overall strategy or methodological framework that a researcher uses to investigate a particular topic. It encompasses the principle, procedures, and techniques employed to collect, analyze, and interpret data in order to address research objectives effectively. Mixed methods research, qualitative research, and quantitative research are the three categories of research methodology. Each approaches have its own strengths, limitations, and applicability to different research questions and contexts. Quantitative Research Approach was followed in this research. Techniques used in quantitative research include measurement and statistical analysis in order to quantify data. Because they offer answers to the research questions that are comparatively conclusive, quantitative research methodologies were chosen. Reliability is usually ensured when data is collected and analysed through the use of standard techniques. If sample sizes are statistically significant, the results can be extrapolated to the whole target population. The method helped to address the research objectives by: enabling to analyze relationships and patterns statistically, generalize findings of broader population, testing the hypothesis and determining the strength and direction of the relationships, allows to assess differences and similarities across different condition, and it generates data-driven insights that can inform evidence-based decision making. Generally Quantitative research approach provides a systematic and rigorous framework for addressing research objectives by enabling to measure, analyze, and interprets numerical data to draw meaningful conclusions and insights.

3.2.3 STUDY DESIGN

Specific forms of inquiry within mixed methods, qualitative, and quantitative approaches that provide research procedures a distinct direction are called research designs. Exploration, description, explanation, prediction, assessment, and history are some of the categories that the research design can be used to classify the objective of the investigation. In this research descriptive research design was followed as well in order to

explain the relationship between the SSCMP (green procurement, sustainable design, sustainable packaging, sustainable distribution, rivers logistic) and sustainable performance. A sort of research approach called descriptive research design seeks to describe or record the traits, actions, viewpoints, attitudes, and perceptions of a population or group that is being studied. It was chosen because, in contrast to exploratory research, it provides a more structured representation of the variables pertinent to the study topic and is correct and legitimate. Research aims are addressed by descriptive research designs, which methodically describe demographic characteristics in line with the objectives of the study.

Common types of descriptive research designs include: cross-sectional study, longitudinal study, case study, survey research, observational research, correlational research, focus group research, and ethnographic research. The cross-sectional descriptive research design was employed in this study. A cross-sectional descriptive research design is a specific approach within the broader category of descriptive research. It provides valuable insights in to the current status or characteristics of a population at a specific point of time, allowing as to draw conclusion about the population.

3.3 POPULATION AND SAMPLING

3.3.1 POPULATION OF THE STUDY

According to Ethiopian National Statical Agency (ENSA) report in 2018, there are 3627 large and medium scale manufacturing industries including both public and private sectors. About 39% of these manufacturing industries are located in Addis Ababa, which is close to 1430 industries, followed by Oromia with more than 29%. This publication also reports that over 298,510 people were engaged in all the manufacturing industries that were surveyed during this period. The Ethiopian National Statical Agency (ENSA) report stratifies the total manufacturing industries in Ethiopia and also specifically in different regions in to 15 groups. Since the total number of all industries is large and difficult to manage, the selected study population and sample frame is the food and

beverage industries in Addis Ababa. This sector includes 259 industries under it which is the predominant one compared to the others (ENSA).

3.3.2 SAMPLING DESIGN

The sample was taken from the sample frame chosen which includes the 259 manufacturing industries in the food and beverage processing firms in Addis Ababa. After calculating the sample size from this the study subjects were selected by simple Random technique. Then one questionnaire was given in person to top management employees that have relation with supply chain and logistics in anyway and that have worked for more than 5years in that firm.

3.3.3 SAMPLE SIZE

Considering the study population is finite in order to help the researcher to provide a systematic approach to determine a sample size needed for the study that is large enough to provide reliable and statistically significant results with a desired level of confidence and precision the researcher chosen to use Krejcie and Morgan (1970). The study population includes 259 food and beverage processing firms in Addis Ababa. The data collected is using 5-point Likert scale and the study population constitutes of people with different level of knowledge and work experience. So, considering these factors according to Ahmad (2017) this is a commonly used formula to determine sample size by different researchers.

$$\mathbf{S = X^2\,NP\,(1\text{-}P)/\,d^2(N\text{-}1) + X^2P(1\text{-}P)}$$ Where,

S = Sample size;

X = Z value/standard normal deviation set at 1.96 (95% confidence level);

N = Population size;

P = Proportion of population (50%, expressed as a decimal 0.5);

d = Degree of accuracy (set at 5% degree of error, expressed as a decimal 0.05, to be accepted as the study will be performed at 95% confidence level). By using the formula, the sample size for this research becomes;

$S = (1.96)^2 * 259 * 0.5(1-0.5) / (0.05)^2 (259-1) + (1.96)^2 * 0.5(1-0.5)$

$= \mathbf{155}$

This sample industries were selected using a proportional simple random selection and questionnaires will be sent to one respondent in the above-mentioned management positions from each selected company.

3.4 DATA SOURCES AND COLLECTION PROCEDURES

Before the data was collected, the researcher obtained an authorization letter from the university. Then, the questions were structured for data collection based on different previously published research. The questionnaire used a 5-point Likert scale to indicate the degree of knowledge and application of sustainable supply chain management techniques, as well as the correlation between supply chain performance and sustainable supply chain management techniques. The Likert scale, which went from 1 = "strongly disagree" to 5 = "strongly agree," was used to collect data on the construct that was being measured. The questionnaires filled by one respondent from each randomly selected 155 large and medium scale food and beverage processing firms at Addis Ababa, who are in positions such as general manager, supply chain manager, Production manager, Warehouse Manager, logistics managers, and employees with an average of at list five years of work experience in their company so that they have good background knowledge about their company. The questionnaires were emailed, physically given and filed with phone communication to the respondents.

3.5 MEASUREMENT DESIGN, VALIDITY AND RELIABILITY

The measurement instruments have been developed by conducting literature reviews that have been used in previous studies to assess similar constructs. Each variable of the studies is conducted from different research like for example green procurement have five measurable items such as selection of environmentally friendly suppliers, purchasing of environmentally friendly materials, suppliers ISO 140001 certification, promote

recycling, and providing product specification to suppliers. Such measuring instruments has been adopted from Esfahbodi et al. (2016), and Zhu et al. (2008).

Table 3.1: Summary of measurement variables

Variable	Dimension/ Factor	No of Indicators/ Items	Source/Author	References that have used the questionnaire previously (examples).
Sustainable Supply Chain Management Practice	Green Procurement	5	Esfahbodi et al. (2016), Laar, (2016), Zhu et al. (2008)	Balda, A., & Singh, R. (2019), Fu, L., et. al. (2023), Le, T. (2020).
	Sustainable design	6	Zhu et al. (2008), Wang & Dai (2017), Esfahbodi et al. (2016),	Adegoke, I., et. al. (2021),Balda, A., & Singh, R. (2019), KRHL, G. STWS, Y., & Aruna S. (2023), Le, T. (2020), Wang, J., & Dai, J. (2018).
	Sustainable packaging	5	Ochieng, (2016)	Balda, A., & Singh, R. (2019), Wang, J., & Dai, J. (2018).
	Sustainable distribution	5	Green et al. (2012), Esfahbodi et al. (2016),	Le, T. (2020), Balda, A., & Singh, R. (2019)
	Reverse logistics	5	Zailani et al. (2012)	Epoh, L. & Mafini, C., (2018).
Sustainable Organizational Performance	Economic Performance	5	Green et al. (2012), Zhu et al. (2008), Esfahbodi et al. (2016),	Adegoke, I., et. al. (2021), Emamisaleh, K., et.al. (2018), KRHL, G., et. al. (2023), and Le (2020)
	Social Performance	5	Das (2018), Wang & Dai (2017),	Adegoke, I., et. al. (2021), Emamisaleh, K., et.al. (2018), KRHL, G., et. al. (2023), and Le (2020)
	Environmental Performance	5	Zhu et al. (2008), Das (2018), Das (2018),	Adegoke, I., et. al. (2021), Emamisaleh, K., et.al. (2018), KRHL, G., et. al. (2023), and Le (2020)

3.6 DATA ANALYSIS

The data was collected, coded, and tabulated for analysis. Descriptive and inferential statistics were particularly used in the analysis process, which was conducted using the SPSS software. descriptive statistics summarizes and describe data, providing simple summaries about the or population and they include measures like mean, median, mode, standard deviation, and variance. On the other hand, inferential statistics, which consist of methods like hypothesis testing, regression analysis, and analysis of variance (ANOVA), use sample data to draw conclusions or forecasts about the population. Finally, correlation was used in the study to determine the direction and degree of correlations between continuous variables. It gives one number the correlation coefficient that represents the strength of the linear link between the variables. A perfect positive linear relationship is represented by a correlation value of +1, a perfect negative linear relationship by a correlation coefficient of -1, and no linear relationship by a correlation coefficient of 0. To determine the link between one or more independent variables and a dependent variable, regression analysis was also used. It offers details on the direction, magnitude, and statistical importance of these correlations between the variables.

3.6.1 VALIDITY

The term "validity" describes how well an instrument assesses the objectives of the researcher. Content validity, criterion-related validity, and construct validity are the three main categories of validity. Content validity was followed in this research. Content validity pertains to the degree to which a measurement tool or assessment precisely captures every facet of the idea or concept that it is intended to assess. In order to establish content validity several steps were undertaken, initially the constructs was clearly articulated and then the instruments was developed that reflects each aspects of the constructs by comprehensive review of relevant literature and theoretical framework. Then the instruments were evaluated by experts in the field in order to assess whether the items adequately represent the construct and provide feedback on the relevance and coverage of items. Then based on expert feedback the items were revised and refined to ensure comprehensive coverage and clarity. Then pilot testing was done in order to identify any gaps or ambiguities in the items. Finally, feedbacks was collected and

analyzed from the pilot test to further refine the instruments and ensure it accurately represent the construct.

3.6.2 RELIABILITY

Cronbach alpha is a commonly used measure of internal consistency reliability. It assesses the consistence to which items in scale or test are correlated with each other. A high alpha coefficient (typically above 0.7) indicates high internal consistency.

Table 3.2: Reliability results of each practice

Variable	Number of Items	Cronbach's Alpha
Green Procurement	5	0.84
Sustainable design	6	0.846
Sustainable packaging	5	0.813
Sustainable distribution	5	0.789
Sustainable Reverse Logistics	5	0.858
Sustainable Performance	15	0.936

Source: - own research

3.6.3 ETHICAL CONSIDERATIONS

The propriety of our actions in respect to the rights of people who are the topic of our work or are impacted by it is referred to as ethics. (Thornhill, Saunders, and Lewis, 2001). When conducting research, four ethical considerations need to be taken into account: informed permission, privacy rights, protection from harm, and candour with colleagues in the field. Thus, the participants in this study were chosen with their complete consent, given the go-ahead to answer questionnaires with confidence and an awareness of the thesis's aim, and given the researcher's assurance that the material would be kept private and used solely for that reason.

CHAPTER FOUR

4 RESULTS AND DISCUSSION

The research objective was to determine the effects of SSCMP of organizations on sustainable performances: The case of Large and Medium Food and Beverage Processing Firms in Addis Ababa, Ethiopia. The results, analysis, and discussion are presented in this chapter. The results are shown as mean, standard deviation, frequency distributions, and percentages.

4.1 DEMOGRAPHIC PROFILE OF RESPONDENTS AND RESPONSE RATE

4.1.1 RESPONSE RATE

A total of 155 questionnaires were distributed to managers and employees who had worked for over five years in food and beverage processing firms in Addis Ababa. All 155 questionnaires were collected, resulting in a 100% response rate.

4.1.2 DEMOGRAPHIC PROFILE OF RESPONDENTS

Table 4.1 Demographic profile of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Sex	Male	97	62.6	62.6	62.6
	Female	58	37.4	37.4	100.0
	Total	155	100.0	100.0	
Age	18-28	35	22.6	22.6	22.6
	29-45	95	61.3	61.3	83.9
	46-60	25	16.1	16.1	100.0
	Total	155	100.0	100.0	
Educational	Bachelor's degree	90	58.1	58.1	58.1

level	Master's Degree and above	62	40.0	40.0	98.1
	Total	155	100.0	100.0	
Work experience	0-5	46	29.7	29.7	29.7
	5-10	69	44.5	44.5	74.2
	10-15	29	18.7	18.7	92.9
	above 15	11	7.1	7.1	100.0
	Total	155	100.0	100.0	
Work Unit	General Manager	11	7.1	7.1	7.1
	Quality Manager	10	6.5	6.5	13.5
	Supply Chain Manager	60	38.7	38.7	52.3
	Logistics Manager	10	6.5	6.5	58.7
	Warehouse Manager	14	9.0	9.0	67.7
	Production Manager	28	18.1	18.1	85.8
	Supply Chain Department	14	9.0	9.0	94.8
	Logistics Department	8	5.2	5.2	100.0
	Total	155	100.0	100.0	

Out of the total respondents, 97 (62.6%) were male and the remaining 58 (37.4%) were female. Regarding respondents age as shown in the above table 87 respondents (61.3%) were in the age between 29-45, 35 respondents (22.6%) were between 18-28, 25 respondents (16.1%) were between the ages of 46-60. With respondents work experience 46 respondents (29.7 %) have 0-5 years of experience, 69 respondents (44.5%) have 5-10 years of experience, 29(18.7%) respondents have 10 - 15years of experience and 11 respondents (7.1%) have above 15 years' experience. This shows that most of the respondents have more than 5years of job experience at their respective positions which makes them more familiar with the company's history as well as practice and be able to give a reliable complete answer. regarding respondents' educational qualification 90 respondents are Batchelor degree holders which constitute (58.1%) of the total respondents, 62 respondents (40%) have masters' degree and above. Taking previous researches into consideration the researcher's expectation was to find most respondents educational level to be masters degree and above but according to the finding most respondents in different managerial positions have bachelor's degree. Considering most

of the respondent's years of experience is 5years and above, this is adequate level of education to be able to understand the questionnaire regarding SSCMP and sustainable performance and give out a reliable answer. regarding respondents work unit out of the total respondents, 11 respondents (7.1%) were General managers, 10 respondents (6.5%) were quality managers, 60 respondents (38.7%) were supply chain managers, 10 respondents (6.5%) were logistics managers, 14 respondents (9%) were warehouse managers, 28 respondents (18.1%) were production managers, 8 respondents (9%) were logistics departments, and 8 respondents (5.2%) were logistics department. The result indicates that most of the respondents are supply chain and production managers which is good considering they will be qualified and knowledgeable enough to understand the questionnaire and give reliable information.

4.2 DESCRIPTIVE ANALYSIS OF DATA

Table 4.2 Summary of composite mean and Standard deviation score

Descriptive Statistics			
	N	Mean	Std. Deviation
G_Procurement	155	3.6335	.75690
S_Design	155	3.6774	.67625
S_Packaging	155	3.5316	.71621
S_Distribution	155	3.6529	.64645
R_Logistics	155	3.4039	.81463
S_Performance	155	3.6589	.67377
Valid N (listwise)	155		

Source: - own research

Green procurement- the highest mean score is obtained on selecting environmentally friendly suppliers and purchasing environmentally friendly materials (3.65), which means most of the respondents agree that these practices are being implemented in there respective manufacturing industries. On the other hand, the lowest mean score is suppliers ISO certification requirement (3.61). Overall, the mean score for all green procurement activities is 3.63, with a standard deviation of 0.7569. which indicates that there is a general agreement by most of the respondents that the above-mentioned green

procurement practices are being implemented in various food and beverage processing industries in Addis Ababa.

Sustainable design- The mean scores of all sustainable design measurement instruments are close to each other. According to the result the highest mean score is design the process for minimization of wastes and the lowest mean score is design of product for reuse/recycle. Overall, the mean score for all sustainable design measurement instruments is 3.67, with a standard deviation of 0.676. most of the respondents took a neutral stand point when it comes to practicing sustainable design for reuse and recycle and designing products with eco-friendly materials but on the other measurements of sustainable design most of the respondents agree on their implementation.

Sustainable packaging- the mean score of focusing on elimination of hazardous materials from packaging (3.71) and on reduction of packaging wight are very high (3.77). on the other hand, Uses of recyclable/ reusable packaging materials are a lowest mean score (3.26). Overall mean score of sustainable packaging measurement instruments is 3.5316 with St. deviation of 0.71621. So according to this research most respondents are neutral regarding the level of implementation of most of the sustainable packaging practices.

Sustainable distribution- Most of the food and beverage processing firms in Addis Ababa distribute products together, rather than in smaller batches, to ensure full vehicle loads for efficiency, which is indicated by the highest mean score of 3.74. Other practices, such as using a good information system and innovative management for efficient loading, scheduling, and routing, selling vehicles that have reached their end of useful life rather than letting them fill the parking yard, and locating near customers to reduce resources consumed in delivering the product to them, also have mean scores greater than 3.6, indicating agreement among respondents regarding the existence of these practices. On the other hand, most of them are neutral as to focusing on the use of green transport system, which has the lowest mean score of 3.35. But the overall sustainable distribution practices in those firms are a total mean score of 3.6529 and with St. Deviation of 0.6446.

Sustainable reverse logistics- According to the respondents, safe disposal of unrecyclable or unreusable waste, especially hazardous waste, has the highest mean score compared to others (3.64), with this practice being the only one that respondents agree is being implemented. On the other hand, employing individuals or firms to collect waste generated by the firm's products received a lower mean score of 3.3, and the other measurements of sustainable reverse logistics also have relatively low mean scores (3.35, 3.34, 3.4). Overall, the mean score of sustainable reverse logistics measurement instruments is 3.404, with a standard deviation of 0.81.

Sustainability Performance- sustainable performance measurement instruments Improvement in investments on social projects (education, culture, sports)) has the highest mean score of 3.83 followed by Reduction in waste (water/solid) which has a mean of 3.78. on the other hand, decreased in cost for energy consumption has a lowest mean (3.54). Overall mean of sustainable performance measurement instruments is 3.6589 with St. deviation of 0.67377. According to the mean analysis of this data most of the respondents Agree that their respective industry has decreased in fee for waste treatment and discharge, has increased in revenue from green products/services, has achieved growth in profit, has maintained or improved health and quality of communities in surrounding areas, has maintained or improved health and safety of workers and customers, has enhanced employee job satisfaction, has attained reduction in air emission, is able to achieve reduction in waste (water/solid), has decreased consumption for hazardous/harmful/toxic materials, has decreased frequency for environmental accidents and has improved company's environmental situation. The overall mean value also suggests most respondents agree on the attainment of most of the sustainable performance measures.

To summarize, based on the overall composite mean scores across the mentioned dimensions, respondents' perceptions regarding the current status of food and beverage processing firms in Addis Ababa sustainable supply chain management practices is that while most of them agree on the implementation of green procurement, sustainable design, and sustainable distribution, and sustainable performance, they took a neutral stand when it comes to sustainable packaging and reverse logistics. Considering the

result, it can safely be concluded that there is a fair level of implementation of sustainable supply chain management practices in various food and beverage manufacturing industries in Addis Ababa. Most respondents also agree that there companies have a good achievement of the performance measures used in this study.

4.3 ANALYSIS OF THE EFFECT OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICE ON SUSTAINABLE PERFORMANCES OF FOOD PROCESSING AND BEVERAGE FIRMS IN ETHIOPIA

The multiple linear regression analysis used in this section of the study examines the impact of sustainable supply chain management practices on the organisational sustainability of Addis Ababa's food and beverage processing companies. As essential phases in the hypothesis testing process, the analysis is carried out.

According to Burns & Burns (2008), regression analysis enables researchers to forecast the likely values of the dependent variable in either a simple linear regression or multiple linear regression based on the known values of the independent variable. Because the study has more than two independent variables, a multiple linear regression will be conducted. Regression analysis was used in the study to determine the degree to which the dependent variable (sustainable performance) is influenced by the independent variable (sustainable supply chain management practices).

4.3.1 TESTING ASSUMPTIONS OF REGRESSION ANALYSIS

a. Pearson Correlation Test

A Pearson correlation test was performed to ascertain the degree of association between the deciding variables and sustainable supply chain management techniques. The outcome is as follows:

Table 4.3: Correlation test

Correlations							
		G_Procurement	S_Design	S_Packaging	S_Distribution	R_Logistics	S_Performance
G_Procurement	Pearson Correlation	1					.
	Sig. (2-tailed)			.			
S_Design	Pearson Correlation	.727**	1	.			
	Sig. (2-tailed)	.000					
S_Packaging	Pearson Correlation	.662**	.750**	1			
	Sig. (2-tailed)	.000	.000		.		
S_Distribution	Pearson Correlation	.517**	.582**	.588**	1		
	Sig. (2-tailed)	.000	.000	.000			
R_Logistics	Pearson Correlation	.666**	.752**	.7007**	.542**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
S_Performance	Pearson Correlation	.656**	.645**	.669**	.610**	.663**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed).							

Source: - Own research

The degree of correlation between two variables is measured by the Karl Pearson's coefficient of correlation (simple correlation), which is represented by the letter r. The values of the Pearson correlation coefficient, or r, vary from +1 to -1. A zero value denotes the absence of any correlation between the two elements. The positive correlation coefficient value (r) ranges from 1; perfectly positive, 0.7-0.9 strong positive, 0.4-0.6 moderate positive, 0.1-0.3 weak positive, 0; no correlation. However, in order to prevent multicollinearity, the correlation coefficient shouldn't increase above 0.8.

As indicated by Table 4.12 above, the results demonstrate a positive correlation (r = 0.727,0.662,0.517,0.666,0.656) between green procurement and sustainable design, sustainable packaging, sustainable distribution, sustainable reverse logistics, sustainable performance respectively. Also, positive correlation between (r=0.750,0.582,0752,0.645) sustainable design and sustainable packaging, sustainable distribution, sustainable revers logistics, sustainable performance respectively. And there is also positive correlation between (r=0.588, 0.707, 0.667) sustainable packaging and sustainable distribution, sustainable reverse logistics, sustainable performance respectively. Also, there is positive correlation between (r=0.542, 0.610) sustainable distribution and sustainable reverse logistics, sustainable performance respectively. Finally, there is also positive correlation between (r=0.663) sustainable reverse logistics and sustainable performance. Since every variable has a perfect positive linear relationship with itself, the correlation coefficients on the major diagonal are always 1. Generally the preceding correlation table shows that there is a substantial correlation between all of the variables with regard to their relationship with the dependent variable, other independent variables, and each other.

b. Sample size Adequacy

According to Tabachnick and Fidell (1996) 'sample size >50+8*m', where m is number of independent variables. In this research there are five independent variables, i.e. the sample size must be greater than 90 (50+8*5). Also, Stevens (1996) recommended that 'for social science research, about 15 subjects per predictor (independent variable) are needed for a reliable equation'. In this research there are five independent variables, then the sample size must be greater than 75 (15*5). So, the sample size of this research is 155 which satisfied the assumptions.

c. All the variables are Continuous.

Every variable is in a continuous format since they are all added up to their Composite mean.

d. Outlier test

As shown below table all the values of the variables are between -3.29 and 3.29, means there is no outlier which satisfies the assumption.

Table 4.4 outlier test

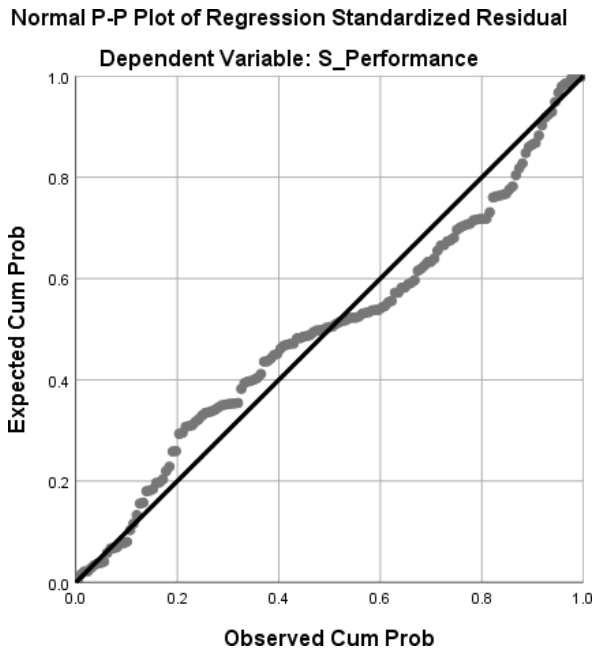
Variable	Standardized value	
	Minimum	Maximum
Green Procurement	-2.42	1.8
Sustainable design	-2.23	1.71
Sustainable Packaging	-2.69	2.05
Sustainable Distribution	-2.25	1.77
Sustainable Reverse Logistics	-2.45	1.95
Sustainable Performance	-2.75	1.99
Note: n=155, if Z value above ±3.29 is considered as outlier		

Influential Point- one of the measures to identify the influential data point is COOK's Distance. If cutoff value for COOK's Distance is greater than 0.5 then it is the sign of influential point which leads to further investigation because influential point affects model coefficient and the hypothesis test result. But in this research the highest COOK's value is 0.29 which is less than 0.5, so there is no sign of influential point.

Leverage Point- measures the influence of point on the fit of the regression. And in this case, there is no high leverage value which affects the model fit.

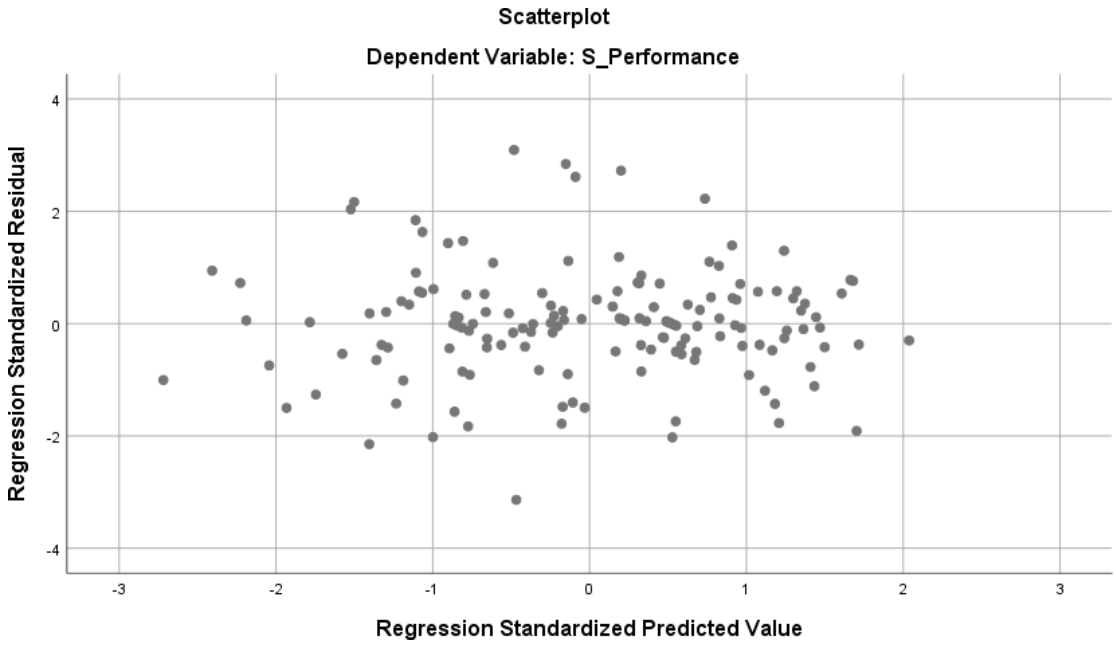
e. Linearity

The model's P-P plot is used to test this assumption. The residuals in this model are distributed closer to normality the closer the dots are to the diagonal line. The assumption of linearity is thus met.



f. Homoscedasticity Test

It can be inferred from the scatterplot output below that the regression model does not exhibit a heteroscedastic problem because the spots appear to be scattered and do not create a distinct pattern.



g. Multicollinearity Test

When there is a strong correlation between the predictor variables, it is referred to as multicollinearity. The variance inflation factor (VIF) must have values less than 10.00, preferably less than 5.00. All of the predictor variables are less than 5, which suggests that there is no multicollinearity, according to the result. Additionally, a tolerance value should be greater than 10%, and the table below shows that all predictor variables have tolerances that are greater than 10%.

Table 4.4: Collinearity Statistics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	G_Procurement	.420	2.381
	S_Design	.291	3.438
	S_Packaging	.359	2.784
	S_Distribution	.597	1.675
	R_Logistics	.370	2.704

h. Autocorrelation

The residual variable and the independent variable have no association if the Durban-Watson value is between 1.5 and 2.5. Based on the table below, the Durban-Watson value is 2.079, which is within the range, indicating that the assumption is met.

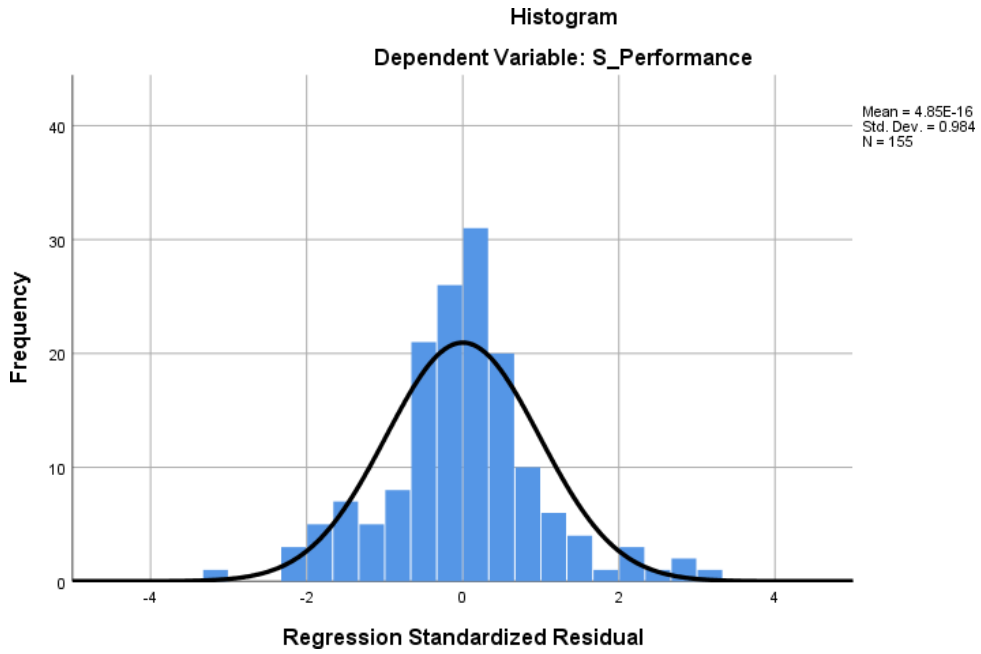
Table 4.5: Model Summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.771[a]	.594	.581	.43630	2.079
a. Predictors: (Constant), R_Logistics, S_Distribution, G_Procurement, S_Packaging, S_Design					
b. Dependent Variable: S_Performance					

i. Normality

As we can see from below, the bars are inside the curve or whenever the bars increase curves also increase and when the bars decrease the curve also decrease, which shows

more than 90% satisfied. And also, the it is located between -3 and 3 which shows our data satisfied Normality assumption.



4.3.2 REGRESSION RESULTS

Model Summary

From the following model summary in Table 4.1, it can be seen that R is .771 and R2 is 0.594 and adjusted R square is 58.1%. This indicates about 58.1% of the variance of Sustainable Performance (dependent variable) can be affected by SSCMP (independent variable), or these five independent variables together they are explaining the variance of dependent variables which indicates a significant explanatory power of the model. The remaining 41.9% is explained by other practices not in the model.

Table 4.6: Model summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.771[a]	.594	.581	.43630	2.079
a. Predictors: (Constant), R_Logistics, S_Distribution, G_Procurement, S_Packaging, S_Design					
b. Dependent Variable: S_Performance					

ANOVA

ANOVA can provide insights into the fit or appropriateness of the model, P value (typically <0.05) suggests that at least one group mean is significantly different from the others, which implies that the model is meaningful in explaining difference between groups, in this case p-value = 0.00 which is less than 0.05. i.e. the model is appropriate.

Table 4.7: Anova Table

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.547	5	8.309	43.651	.000[b]
	Residual	28.364	149	.190		
	Total	69.911	154			
a. Dependent Variable: S_Performance						
b. Predictors: (Constant), R_Logistics, S_Distribution, G_Procurement, S_Packaging, S_Design						

Source: own survey 2024

To investigate the effect of independent variables over dependent variables, multiple regression analysis was utilised.

Table 4.9 regression result

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.624	.226		2.765	.006	.178	1.070
	G_Procurement	.216	.072	.243	3.012	.003	.074	.358
	S_Design	.012	.096	.012	.121	.904	-.179	.202
	S_Packaging	.192	.082	.205	2.350	.020	.031	.354
	S_Distribution	.249	.071	.238	3.532	.001	.110	.389
	R_Logistics	.181	.071	.219	2.556	.012	.041	.322
a. Dependent Variable: S_Performance								

Hypothesis Testing

Hypothesis 1:1 *Green procurement has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

Hypothesis 0:1 *Green procurement has no effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

As seen in table 4.16 above, the multiple regression findings showed that Green Procurement has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.243), at 95% confidence level, p value = 0.003 (<0.05), t value =3.012 (>1), and zero is excluded between upper and lower bound. Therefore, the null hypothesis is rejected.

Hypothesis 1:2 *Sustainable Design has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

Hypothesis 0:2 *Sustainable Design has no effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

As seen in table 4.16 above, the multiple regression findings showed that sustainable design has no effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.012), at 95% confidence level, p value = 0.904 (>0.05), t value =0.121 (<1), and zero is included between upper and lower bound. Therefore, the alternative hypothesis is rejected.

Hypothesis 1:3 *Sustainable Packaging has significant and positive effect on economic performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

Hypothesis 0:3 *Sustainable Packaging has no effect on economic performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia*

As seen in table 4.16 above, the multiple regression findings showed that sustainable packaging has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.205), at 95% confidence level, p value = 0.020 (<0.05), t value =2.350 (>1), and zero is excluded between upper and lower bound. Therefore, the null hypothesis is rejected.

Hypothesis 1:4 *Sustainable Distribution has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

Hypothesis 0:4 *Sustainable Distribution has no effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

As seen in table 4.16 above, the multiple regression findings showed that sustainable distribution has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.238), at 95% confidence level, p value = 0.001 (<0.05), t value =3.532(>1), and zero is excluded between upper and lower bound. Therefore, the null hypothesis is rejected.

Hypothesis 1:5 *Sustainable Reverse Logistics has significant and positive effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

Hypothesis 0:5 *Sustainable Reverse Logistics has no effect on sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia.*

As seen in table 4.16 above, the multiple regression findings showed that sustainable reverse logistics has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.219), at 95% confidence level, p value = 0.012 (<0.05), t value =2.556(>1), and zero is excluded between upper and lower bound. Therefore, the null hypothesis is rejected.

4.3.3 DISCUSSION

Before interpreting the results, the researcher confirmed that all regression assumptions were satisfied, including: outlier, linearity, homoscedasticity, normality, and the absence of multicollinearity.

The findings indicate that, with the exception of sustainable design, all independent variable coefficients are positive at $p<0.05$. This suggests that a rise in the independent variables (green procurement, sustainable packaging, sustainable distribution, and sustainable reverse logistics) will lead to an improvement in the sustainable performance of the company. Green procurement is the most important component that impacts an organization's sustainable performance, according to the coefficients ($\beta=0.243$).

Green procurement has a positive and significant effect on sustainable performance in food and beverage manufacturing firms in Addis Ababa, (with a β value ($\beta =0.243$), at 95% confidence level, p value = 0.003 (<0.05), t value =3.012 (>1), and zero is excluded between upper and lower bound), it means that adopting environmentally friendly procurement practices leads to measurable improvements in the sustainability outcomes of these firms. as those firms increase their green procurement practices, their sustainable performance improves. food and beverage processing firms in Addis Ababa can achieve substantial environmental and economic benefits by integrating sustainable procurement practices into their operations. This not only helps the firms themselves but also contributes to broader environmental and societal goals.

Sustainable design has no effects on sustainable performance in food and beverage processing firms in Addis Ababa, (with a β value ($\beta =0.012$), at 95% confidence level, p value = 0.904 (>0.05), t value =0.121 (<1), and zero is included between upper and lower bound). The regression analysis shows no statistically significant relationship between sustainable design and sustainable performance, meaning that changes in sustainable design practices do not predict changes in sustainable performance. This could be due to a variety of factors including measurement issues. even though sustainable design is an essential part of environmental and social responsibility, More research is required to examine other issues, such as: product longevity and durability, designs goods to

minimise or completely eliminate the usage of dangerous materials and/or the processes involved in their production. customer collaboration to create eco-design, a design approach that lowers noise and air emissions, and Redesigning processes for emissions reduction that might influence sustainable performance and to investigate if different approaches to sustainable design might yield different results.

Sustainable packaging has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, (with a β value (β =0.205), at 95% confidence level, p value = 0.020 (<0.05), t value =2.350 (>1), and zero is excluded between upper and lower bound). this means that as firms increase their use of sustainable packaging, their sustainable performance improves. A significant effect indicates that the relationship between sustainable packaging and sustainable performance is not random chances. The statistical analysis shows a reliable and consistent impact, suggesting a strong correlation between the two variables. Generally, the finding that sustainable packaging has a positive and significant effect on sustainable performance suggests that food and beverage firms can achieve substantial environmental and economic benefits by adopting sustainable packaging practices. This not only helps the firms themselves but also contributes to broader environmental and societal goals. Firms should continue to innovate and improve their sustainable packaging practices, integrating them into a comprehensive sustainability strategy to maximize their impact.

Sustainable distribution has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, (with a β value (β =0.238), at 95% confidence level, p value = 0.001 (<0.05), t value =3.532(>1), and zero is excluded between upper and lower bound). this means that as those firms enhance there sustainable distribution practice, there sustainable performance increases. A significant effect means that the relationship between sustainable distribution and sustainable performance is not due to random chance, the analysis shows a reliable and consistent impact, including a strong correlation between the two variables. The finding that sustainable distribution has a positive and significant effect on sustainable performance highlights the importance of optimizing logistics and distribution processes in large and medium food and beverage processing firms. Those firms can achieve

substantial environmental and economic benefits by implementing sustainable distribution practices, contributing to overall sustainability goals. These practices not only enhance the firm's performance but also improve their reputation and compliance with environmental standards. By continually improving and innovating in sustainable distribution, those firms can maintain a competitive edge and ensure long-term sustainability.

Sustainable reverse logistics has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, (with a β value (β =0.219), at 95% confidence level, p value = 0.012 (<0.05), t value =2.556(>1), and zero is excluded between upper and lower bound). it means that implementing sustainable reverse logistics practices leads to measurable improvements in these firms' sustainability outcomes. A positive effect indicates that as firms enhance their sustainable reverse logistics practices, their sustainable performance improves. A significant effect means that the relationship between sustainable reverse logistics and Sustainable performance is not due to random chance. The statistical analysis shows a reliable and consistent impact, suggesting a strong correlation between the two variables. The finding that sustainable reverse logistics has a positive and significant effect on sustainable performance underscores the importance of efficient and sustainable management of returned products and materials in the food and beverage industry. By adopting sustainable reverse logistics practices, firms can achieve substantial environmental and economic benefits, contributing to their overall sustainability goals. These practices not only enhance the firm's performance but also improve their reputation and compliance with environmental standards. Continually improving and innovating in sustainable reverse logistics ensures long-term sustainability and a competitive edge in the industry.

The variable with the highest beta value, green procurement (0.243), is the most significant factor; it is followed by sustainable distribution (0.238), sustainable reverse logistics (0.219), and sustainable packaging (0.205).

CHAPTER FIVE

5 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY OF THE MAJOR FINDINGS

The main conclusions are summarised using the descriptive and inferential analysis that is provided in Chapter four.

Based on the cumulative result of inferential statistics:

Regarding the correlation result, the results indicate that:

The correlation result showed that there is moderate positive relationship between green procurement, Sustainable design, Sustainable packaging, sustainable distribution, sustainable reverse logistics, and sustainable performance.

The results demonstrate a positive correlation (r = 0.727,0.662,0.517,0.666.0.656) between green procurement and sustainable design, sustainable packaging, sustainable distribution, sustainable reverse logistics, sustainable performance respectively. Also, moderate positive correlation between (r=0.750,0.582,0752,0.646) sustainable design and sustainable packaging, sustainable distribution, sustainable revers logistics, sustainable performance respectively. And there is also moderate positive correlation between (r=0.588, 0.707, 0.669) sustainable packaging and sustainable distribution, sustainable reverse logistics, sustainable performance respectively. Also, there is moderate positive correlation between (r=0.542, 0.610) sustainable distribution and sustainable reverse logistics, sustainable performance respectively. Finally, there is also moderate positive correlation between (r=0.663) sustainable reverse logistics and sustainable performance.

Regarding the correlation result, the results indicate that:

H1: Green Procurement has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.243), at 95% confidence level, p value = 0.003 (<0.05), t value =3.012 (>1), and zero is excluded between upper and lower bound.

H0: Sustainable design has no effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.012), at 95% confidence level, p value = 0.904 (>0.05), t value =0.121 (<1), and zero is included between upper and lower bound.

H1: Sustainable packaging has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.205), at 95% confidence level, p value = 0.020 (<0.05), t value =2.350 (>1), and zero is excluded between upper and lower bound.

H1: Sustainable distribution has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.238), at 95% confidence level, p value = 0.001 (<0.05), t value =3.532(>1), and zero is excluded between upper and lower bound.

H1: Sustainable reverse logistics has a positive and significant effect on Sustainable performance of large and medium food & beverage processing firms in Addis Ababa, Ethiopia with a β value (β =0.219), at 95% confidence level, p value = 0.012 (<0.05), t value =2.556(>1), and zero is excluded between upper and lower bound.

5.2 CONCLUSION

The food and beverage industry are a vast business which has wide variety of different companies under it with sensitive safety and efficacy issues surrounding it**.** This research started off by referring to other papers which most of them suggested that in developing countries like ours the understanding as well as implementation of sustainable supply

chain management practices is infantile and also the impact that it could have on performance is not well studied (Balda & Singh, 2019). After doing analysis of the collected data, we can conclude that the implementation of sustainable supply chain management practices is above average (with mean of 3.2-3.8). the growth in the level of awareness, understanding and implementation of sustainable supply chain management practices can be evidence to show that our industries are evolving for the better.

Considering the overall mean value of the independent variables, green procurement, sustainable design, sustainable packaging and sustainable distribution have a value >3.5 where most of the respondents agree that they are being implemented in their respective industries. The score for sustainable reverse logistics is relatively low (3.4) even though it is still above average. When looking at the individual measurement parameters of the independent variables like designing product for reuse/recycle, using recyclable/reusable packaging materials, utilizing environment friendly packaging, focusing on the use of green transport mechanisms and majority of sustainable reverse logistics practices have a low score of ≤3.4, which shows that most respondents are indifferent or don't agree on the implementation these practices.

The other finding on this study is that all the independent variables have a strong and moderate positive correlation/linear relationship with each other and sustainable performance. Correlation measures the strength and direction of the relationship between two variables, based on the classification of correlation coefficient the linear relationship b/n the variables can be 1; perfectly positive, 0.7-0.9 strong positive, 0.4-0.6 moderate positive, 0.1-0.3 weak positive, 0; no correlation. So according to the results above sustainable design has a strong positive correlation with green procurement, sustainable packaging and reverse logistics with a score of greater than 0.7. sustainable packaging also has strong correlation with reverse logistics. But since there is no value of 0.8 or above there is no collinearity b/n the variables.

After testing the hypothesis using multiple regression analysis, the findings of this research conclude that green procurement, sustainable packaging, sustainable reverse logistics has a significant and positive effect on sustainable performance of large and medium food and beverage processing firms in Addis Ababa, sustainable distribution also

has a significant and positive effect on sustainable performance of large and medium food and beverage processing firms in Addis Ababa, In most of the studies the finding suggest there is statistically significant relationship between sustainable design and sustainable performance, but in this study sustainable design has no statistical effect on sustainable performance. despite the fact that sustainable design is a crucial component of environmental and social responsibility the selected measures under it showed no evident impact on sustainable performance, further research is needed to explore other factors like - product longevity and durability, designs goods to eliminate the usage of dangerous materials, customer collaboration to create eco-design, a design approach that lowers noise and air emissions, and Redesigning processes for emissions reduction that might influence sustainable performance and to investigate if different approaches to sustainable design might yield different results.

In conclusion improving quality of products provided and insuring customers as well as employees safety and health in the process warrants industries local as well as global competitiveness. This can be achieved by knowing our strengths and weaknesses and improving on them. The positive relation b/n green procurement, sustainable procurement, sustainable distribution, sustainable reverse logistics and sustainable performance is also supported by most researches in developing and developed nations as discussed above.

5.3 RECOMMENDATIONS

The study has out lined which sustainable supply chain management practices are being implemented well and which have low level of implementation. So based on the findings its recommended that companies should improve and try to implement this sustainable supply chain management practices to the fullest in order to achieve the optimal gain in sustainable economic, social and environmental performance. According to this study its recommended companies in the food and beverage industries to focus and work more on green procurement, sustainable packaging, sustainable distribution, and sustainable reverse logistics, since these are the practices that proved to have positive significant effect on sustainable performance. The different food and beverage industries in Addis

Ababa can design their own model based on the above findings to help them achieve national as well as global success and competitiveness. Practices like reuse/recycling of products have generally shown to have weak implementation even though they have been universally proven to be beneficial to environmental preservation and health of society, so it's recommended that these practices should be enforced by the responsible authorities to insure they are fully practised.

The research findings also suggest the following action items for each profession, in addition to the suggestions mentioned above.

Green Procurement- Develop and implement sustainable procurement policies like: create clear policies that prioritize sourcing from suppliers, require suppliers to have to sustainability standards and certifications, and include sustainability criteria in the supplier selection process and regularly audit suppliers for compliance.

Sustainable Packaging- Material selection like: use recyclable, biodegradable, or compostable packaging materials, avoid single-use plastics and opt for materials with a lower environmental footprint. Packaging reduction like: Design packaging to use the minimum amount of material necessary to protect the product, thereby reducing waste and costs. Collaboration with suppliers like: work closely with packaging suppliers to develop and source sustainable packaging solutions.

Sustainable Distribution- Optimize transportation and logistics like: reduce fuel usage and emissions by optimising delivery routes using cutting-edge logistics technologies, invest in energy-efficient or alternative-fuel vehicles, such as electric or hybrid vehicles. Collaboration with logistics partners like: collaborate with logistics partners to enhance overall supply chain sustainability.

Sustainable Reverse Logistics- Efficient returns management like: Implement systems for efficiently handling product returns, focusing on minimizing waste and maximizing resource recovery, develop robust recycling and reuse programs to handle returned products and packaging materials. Product refurbishment like: Explore opportunities to refurbish and resell returned products, generating additional revenue while reducing

waste. Customer incentives like: offer incentives to customers for returning used products and packaging, encouraging participation in reverse logistics programs.

5.4 LIMITATIONS OF THE STUDY

The study was conducted on food and beverage industries but only in Addis Ababa. Since there are a lot of other industries outside of the capital city which might have different opinions regarding the area of the study so this makes it difficult to conclude for the entire industry in the country. The data is also collected with a predetermined questionnaire with limited answer which could limits the respondents from giving their free views and opinions on the mentioned issues. The respondents are selected randomly from different mixed industries which manufacture different products with a varying manufacturing process (like the food industry, the beverage industry) this makes it difficult to insure fair and equivalent representation of the different industries.

5.5 RECOMMENDATIONS FOR FUTURE RESEARCH

From the regression model findings, the model explains 58.1% of the variance in the sustainable performance (dependent variable). This suggest that the selected five practices (independent variables) are significant predictors of the outcome, but there is still 41.9% of the variance that remain unexplained. future research should focus on validating these findings across different populations and exploring potential additional practices to further enhance result accuracy. Specially, different additional measures of sustainable design can be studied in a wider study population to confirm the no relation result this study found with sustainable performance. Other researches can also be done to study the specific relation between the independent variables and triple bottom lines of sustainable supply chain management practices (economic, social, environmental performances) separately.

6 REFERENCES

Adegoke, I., et. al. (2021). Impact of Sustainable Supply Chain Management Practices on Organizational Performance. Ghana: Management Science and Business Decisions, Vol. 1(2). Pp. (23-38).

Ali, A., et. al. (2017). Green supply chain management - food for thought, International Journal of Logistics Research and Applications, Vol 20(1), pp (22-38).

Ali, I. & Aboelmaged M. (2021). Implementation of supply chain 4.0 in the food and beverage industry: perceived drivers and barriers. International Journal of Productivity and Performance Management. Vol. 71(4), pp. (1426-1443).

Balda, A., & Singh, R. (2019). Sustainable Supply Chain Management Practices in Ethiopian Manufacturing Firms. International Journal for Research in Engineering Application & Management, Vol-05(01).

Baojuan, S. (2008). Green supply chain management and implementing strategy. International Conference on Logistics Engineering and Supply Chain, (p. 85).

Barbier, B. (2007). Frontiers and sustainable economic development. Environmental and Resource Economics. Vol. 37(1), pp. (271- 295).

Barney, J. & Clark, D. N. (2007). Resource-Based Theory. Creating and Sustaining Competitive Advantage: Oxford University Press.

Beske, P., Land, A. & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry. A critical analysis of the literature. Int. J. Prod. Econ. Vol. (152), pp. (131-143).

Bor, J., Ngugi, P., & Odhiambo, R. (2019). Effect of green purchasing on performance of food and beverage processing sector. Kenya: European Journal of Logistics, Purchasing and Supply Chain Management Vol.7(4), pp. (25-34).

Bortolini, M., et. al. (2016). Fresh food sustainable distribution: cost, delivery time and carbon footprint three-objective optimization. Journal of Food Engineering, Vol.(174), pp. (56-67), doi: 10.1016/j.jfoodeng.2015.11.014.

Buyukozkan, G. & Cifci, G. (2012). Evaluation of green supply chain management practices. A fuzzy ANP approach. Production Planning & Control, Vol.23(6), pp. (405-418). https://doi.org/10.1080/09537287.2011.561814

Cagno, E., et.al. (2019). Industrial sustainability performance measurement systems. A novel framework. Journal of Cleaner Production. Vol. 230, pp (1354-1375).

Dabhilkar, M., Bengtsson, L., & Lakemond, N. (2016). Sustainable supply management as a purchasing capability. A power and dependence perspective. International Journal of Operations & Production Management. Vol. 36(1), pp. (2–22).

Das, D. (2018). The impact of sustainable supply chain management practices on firm performance. Lessons from Indian organizations. Journal of cleaner production, Vol. (203), pp. (179-196).

Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. International Journal of Production Economics. Vol. 181, pp. (350-366).

Emamisaleh, K., Rahmani, K., & Iranzadeh S. (2018). Sustainable Supply Chain Management Practices and Sustainability Performance in the Food Industry. The South East Asian Journal of Management, Vol. 12(1), pp. (1-19).

Epoh, L. & Mafini, C., (2018). Green supply chain management in small and medium enterprises: Further empirical thoughts. South Africa: Journal of Transport and Supply Chain Management Vol. 12(0), pp. (393).

Fawcett, E., Ellram, M., & Ogden, A. (2007). Supply chain management: from vision to implementation. Upper Saddle River, NJ: Pearson Prentice Hall.

Fu, L., et. al. (2023). The impact of green supply chain management on enterprise environmental performance. a meta-analysis. Chinese: Management Studies Vol. 17(2), pp. (274-289).

Giunipero, C., Hooker, E., & Denslow, D. (2012). Purchasing and supply management sustainability. Drivers and barriers. Journal of Purchasing and Supply Management. Vol. 18(4), pp. (258-269)

Govindan, K., et. al. (2020). Supply chain sustainability and performance of firms. A meta-analysis of the literature.

Green, J., et. al. (2012). Do environmental collaboration and monitoring enhance organizational performance? Industrial Management & Data Systems, Vol. 112(2), pp. (186-205).

Gualandris, J., Golini, R., & Kalchschmidt, M. (2014). Do supply management and global sourcing matter for firm sustainability performance? An international study. Supply Chain Management: An International Journal, Vol. 19(3), pp. (258-274).

Halldórsson, A., Kotzab, H., & Skjøtt-larsen, T. (2009). Supply chain management on the crossroad to sustainability: a blessing or a curse? Logistic Research. Vol. (1) pp. (83-94).

Hubeau, Marianne & Marchand, Fleur & Coteur, Ine & Mondelaers, Koen & Debruyne, Lies & Van Huylenbroeck, Guido. (2017). A new agri-food systems sustainability approach to identify shared transformation pathways towards sustainability. Ecological Economics. 131. 52-63. 10.1016/j.ecolecon.2016.08.019.

Islam, Z., Zunder, H., & Jorna, R. (2013). Performance evaluation of an online benchmarking tool for European freight transport chains. Benchmarking: An International Journal.

Kähkönen, A., Lintukangas, K., & Hallikas, J. (2018). Sustainable supply management practices: Making a difference in a firm's sustainability performance. Supply Chain Management: An International Journal, Vol. 23(6), pp. (518-530).

Kashmanian, M., & Moore, R. (2014). Building greater sustainability in supply chains. Environ Qual Manage, Vol.23(4), pp. (13-37).

Kilubi, I., & Rogers, H. (2018). Bridging the gap between supply chain risk management and strategic technology partnering capabilities: Insights from social capital theory. Supply Chain Management: An International Journal. Vol. 23(4), pp. (278-292).

Khanam, Z. & Ghosh, R. (2022). Impact of sustainable supply chain management on cost performance. empirical evidence from manufacturing companies. Bangladesh:. Journal of Economic and Administrative Sciences. DOI:10.1108/JEAS-02-2022-0050

Kim, J., & Rhee, J. (2012). An empirical study on the impact of critical success factors on the balanced scorecard performance. Korean: green supply chain management enterprises. International Journal of Production Research, Vol. 50(9), pp. (2465-2483).

KRHL, G. STWS, Y., & Aruna S. (2023). Impact of Green Supply Chain Management Practices on Triple Bottom Line Performance and Moderating Effect of Institutional Pressure. Asian Journal of Management studies, Vol. 3(1), pp. (1-21).

Kuwornu, J, et. al. (2022). The adoption of sustainable supply chain management practices on performance and quality assurance of food companies. Sustainable futures. Vol (5)

Kumar, S., Chattopadhyaya, S., Sharma, V. (2012). A case study from Indian electrical and electronics industry. Indian: International Journal of Soft Computing and Engineering, Vol. 1(6), pp. (275-281).

Laosirihongthong, T., Adebanjo, D., & Choon Tan, K. (2013). Green supply chain management practices and performance. Industrial Management & Data Systems. Vol. 113(8), pp. (1088-1109).

Le, Thi. (2020). The effect of green supply chain management practices on sustainability performance in Vietnamese construction materials manufacturing enterprises. Uncertain Supply Chain Management vol. (8) pp. (43-54), www.winebusiness.com.

Mani, V., et. al. (2016). Supply chain social sustainability for developing nations: Evidence from India. Resources, Conservation and Recycling, Vol. (111), pp. (42-52).

Mastos, T., & Gotzamani, K. (2022). Sustainable Supply Chain Management in the Food Industry. A Conceptual Model from a Literature Review and a Case Study. Foods. Vol. (11), p. (2295).

Mulweye, D. et. al. (2024). Supply Chain Visibility and Performance of Food and Beverage Manufacturing Firms. Kenya: International Journal of Supply Chain Management. Vol.9(1), pp (51 – 71).

Mulugeta, A. (2021). Green Supply Chain Management Practices and Challenges Addis Ababa: The Case of Coca Cola Beverages Africa Addis Ababa Plant. Addis Ababa University School of Commerce.

Muthoni, J. & Mose, T. (2020). Influence of supply chain management practices on performance of food and beverage manufacturing firms. Kenya: International Academic Journal of Procurement and Supply Chain Management. Vol 3(2), pp. (45-62).

Nagib, A. et.al. (2016). The Role of Hybrid Make-to-Stock (MTS)-Make-to-Order (MTO) and Economic Order Quantity (EOQ) Inventory Control Models in Food and Beverage Processing Industry. In IOP Conference Series Vol. 160(1), p. 012003.

Nigatu, M. (2020). The practices and challenges of green supply chain management implementation in bottled water industry. Addis Ababa.

Nyongesa, A. & Chege D. (2020). Effect of waiting time planning on supply chain performance in food and beverage processing companies. Kenya: Vol. 7(4), pp (77-85).

Ochieng, O.,et. al. (2016). green supply chain management practices and performance of iso 14001 certified manufacturing firms in east Africa. DBA Africa Management Review. Vol 6 (3), pp. (103-128).

Oelze, N. (2017). Sustainable supply chain management implementation, Enablers and barriers in the textile industry. *Sustainability*. Vol (*9*). p. (1435).

Oktem, U. (2014). Assessment of Environmentally Sustainable Technologies as if Individuals Matter.

Oláh, J., et. al. (2019). Achieving sustainable e-commerce in environmental, social and economic dimensions by taking possible trade-offs. Sustainability, Vol. 11(1), p. (89).

Onyinkwa, C. & Ochiri, G. (2016). Effects of Green Supply Chain Management Practices on Competitiveness of Firms in the Food and Beverage Sector. Kenya: European Journal of Business and Management. Vol.8(14).

Pullman, E., Maloni, J., & Carter, R. (2009). Food for thought: Social versus environmental sustainability practices and performance outcomes. J. Supply Chain. Manag. Vol. (45), pp. (38-54).

Saunder, L. and Thorn H., 2001, Research perspective: stage publication, London.

Seroka-Stolka, O., (2014). The development of green logistics for implementing sustainable development strategy in companies. Procedia - Social and Behavioural Sciences Vol. (151), pp. (302-309). https://doi.org/10.1016/j.sbspro.2014.10.028.

Seuring, S., et. al. (2008). Sustainability and supply chain management - An introduction to the special issue. J. Clean. Prod.

Siregar, D., & Pinagara, F. (2022). Analysis of The Relationship between Practices and Performance of Green Supply Chain Management in Indonesian Micro, Small, and Medium Enterprises (MSMEs). The South East Asian Journal of Management Vol. 16(2), pp. (119-135).

Sriyogi, K., Agrawal, R., & Sharma, V. (2013). Sustainable Supply Chain Management Practices in Indian Manufacturing Firms a Case Based Research. Proceedings of 3rd International Conference on Business analytics at Great Lakes Institute of Management.

Subramaniyan, M. (2015). Production data analytics-to identify productivity potentials (Master's thesis).

Susitha, E., & Nanayakkara, M. (2023). Impact of green supply chain management practices on the triple bottom line: a study on apparel manufacturers. Sri Lanka: journal of asia business studies Vol. 17(6), pp. (1228-1249).

Thach, L. (2002). Social Sustainability in the Wine Community. Managing for Employee Productivity and Satisfaction. Wine Business Monthly. Available online.

Varnas, A., Balfors, B, & Faith-Ell, C., (2009). Environmental consideration in procurement of construction contracts. current practice, problems and opportunities in green procurement in the construction industry. Sweden Journal of Cleaner Production, Vol. 17, pp. (1214-1222).

Varsei, M., et. al. (2014). Framing sustainability performance of supply chains with multidimensional indicators. Supply Chain Management. Vol. 19(3), pp. (242-257).

Verghese, K. and Lewis, H., (2007). Environmental innovation in industrial packaging. a supply chain approach. International Journal of Production Research. Vol. 45(18), pp. (4381- 4401).

Waddock, A., & Graves, S. (1997). The Corporate Social Performance-Financial Performance Link. Strat. Manag. J. Vol. (18), pp. (303-319).

Wang, J., & Dai, J. (2018). Sustainable supply chain management practices and performance. Industrial Management & Data Systems, Vol. 118(1), pp. (2-21).

WCED, (1987). Brundtland report. Report of the World Commission on Environment and Development. Our Common Future toward sustainable development.

Worku, H, & Virdi, S. (2019). Green Supply Chain Management Practices in Ethiopia's Leather and Leather Product Industry. IUP Journal of Supply Chain Management. Vol. 16(2), pp. (25-42).

Yildiz Çankaya, S. & Sezen, B. (2019), Effects of green supply chain management practices on sustainability performance. Journal of manufacturing technology management. Vol. 30(1), pp. (98-121). https://doi.org/10.1108/JMTM-03-2018-0099

Zailani, M., et. al. (2012), The impact of external institutional drivers and internal strategy on environmental performance. International Journal of Operations & Production Management. Vol.32(6), pp.(721-745). https://doi.org/10.1108/01443571211230943

Zhu, Q., Sarkis, J. & Geng, Y. (2005). Green Supply Chain Management. China: Pressures, Practices and Performance, International Journal of Operations and Production Management. Vol. 25(5), pp. (449-468).

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

Zhu, Q., Liu, J., & Lai, H. (2016). Corporate social responsibility practices and performance improvement among Chinese national state-owned enterprises. International Journal of Production Economics, Vol. 171(3), pp. (417-426).

Zhu, Q., Tian, Y. & Sarkis, J., (2012). Diffusion of selected green supply chain management practices, China: An assessment of Chinese enterprises, Production Planning & Control, Vol. (23), pp. (10-11).

7 APPENDIX A: RESEARCH QUESTIONNAIRE

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE GRADUATE STUDIES

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

QUESTIONNAIRE TO BE FILLED BY RESPONDENTS

Dear Sir/Madam, I am a post graduate student at Addis Ababa University School of Commerce conducting research on ‘’SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES AND SUSTAINABILITY PERFORMANCE IN FOOD AND BEVERAGE MANUFACTURING COMPANIES IN ADDIS ABABA ‘’ as a partial fulfilment of the requirement of degree of masters of logistics and supply chain management.

Enclosed with this letter is a brief questioner that askes a variety of questions about your experience toward sustainable supply chain management practice in your company. I am asking you to look over the questioner and please complete the questioner and I will be most great full if you could kindly complete this questioner.

The information given here will only be used for purpose of this study and will be treated with utmost confidentially. Your assistance in the completion of this questioner will be highly appreciated.

Thank you in advance for your cooperation!

QUESTIONNAIRE

This questionnaire consists of four sections, the first part with demographic data, the second part with questions on impact of Sustainable Supply Chain Management Practices, the third part with questions on Sustainable Performances, and the fourth part is questions regarding sustainable supply chain management practice implementations.

SECTION I: Demographic Data

Answer by ticking (√) against the correct response that represents appropriately your situation

1. What is your gender? Male ☐ Female ☐

2. Kindly indicate your age bracket (Tick as appropriate) Less than 30 years ☐ Years 31 - 40 ☐

40 – 50 years ☐ Over 51 years ☐

3. How long have you been working in this firm?

0-5 yrs. ☐ 5-10 yrs. ☐ 10-15 yrs. ☐ Over 15 yrs. ☐

4. What is your highest academic qualification?

Bachelor's degree ☐ Master's Degree and above ☐

5. In which department do you work in?

General Manager ☐ Quality Manager ☐ Supply Chain Manager ☐

Logistics Manager ☐ Warehouse Manager ☐

Production Manager ☐

SECTION II

Questions related with Sustainable Supply Chain Management Practice. Please indicate your level of agreement by using a tick (√) mark. The five Likert Scale points denote: 1=Strongly Disagree, 2=Disagree, 3=Neutral 4=Agree 5= Strongly Agree. The questions grouped as five topics are:

No	Sustainable Supply Chain Management Practices	1	2	3	4	5
A. Green Procurement						
1	Your organization considers selecting environmentally Friendly suppliers during its selection process					
2	Your organization considers purchasing of environmentally friendly materials					
3	Your organization requires the suppliers to be ISO 140001					
4	Your organization purchases materials that promote recycling					
5	Your organization providing product specifications to suppliers that include environmental requirements for a purchased item.					
B. Sustainable Design						
6	Your organization design products for reuse & recycle.					
7	Your organization Design of products considering life-cycle assessment.					
8	Your Organization Design the processes for minimisation of waste					
9	Your organization Designs products with eco-friendly materials					
10	Your organization Designs products for reduced material consumption					
11	Your organization Designs production process for reduced energy usage,					
C. Sustainable Packaging						
12	Your organization Utilizes environment-friendly packages					

13	Your organization Uses recyclable/ reusable packaging materials.					
14	Your Organization Make a continuous effort to find new reusable materials for packaging					
15	Your organization Focuses on elimination of hazardous materials from packaging					
16	Your organization Focuses on reduction of packaging weight					
D. Sustainable Distribution						
17	Your organization Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency					
18	Your organization Focuses on the use of green transport mechanisms					
19	Your organization focuses on full truck load transportation usage					
20	Your organization use a good information system and innovative management for efficient loading, scheduling and routing					
21	Your organization sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.					
22	Your organization locate near customers to reduce resources consumed in getting the product to them					
E. Reverse Logistics						
23	Your organization Install collection points for used products and packaging for reuse and recycling					
24	Your organization Employ individuals or firms to collect waste generated by the firm's products.					
25	Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products					
26	Your organization Safe disposal of unrecyclable or unreusable waste (especially hazardous waste)					
27	Your organization Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products.					
28	Put in place systems to monitor reverse flows of materials.					

SECTION III

Questions related with Sustainable Performance. Please indicate your level of agreement by using a tick (√) mark. The five Likert Scale points denote: 1=Strongly Disagree, 2=Disagree, 3=Neutral 4=Agree 5= Strongly Agree. The questions grouped as five topics are:

Sustainable Performances		1	2	3	4	5
A. Economic Performance						
1	Decreased cost for materials purchased					
2	Decreased in cost for energy consumption					
3	Decreased in fee for waste treatment and discharge					
4	Increase in revenue from green products/ services					
5	Profits growth					
6	Improvement in investments on social projects (education, culture, sports)					
7	maintain or improve health and quality of communities in surrounding areas					
8	maintain or improve health and safety of workers and consumers					
9	Enhanced employee job satisfaction					
10	enhances self-reliance of workers					
11	Reduction in air emission					
12	Reduction in waste (water/solid)					
13	Decreased consumption for hazardous/harmful/toxic materials					
14	Decreased frequency for environmental accidents					
15	Improve a company’s environmental situation					

8 APPENDIX B: RELIABILITY TEST

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Selecting Environmentally Friendly Materials	14.13	9.881	.789	.758
purchasing Environmentally Friendly Materials	14.10	10.864	.648	.800
Suppliers ISO Certification Requirements	14.17	10.728	.602	.812
Purchasing Materials that promote Recycling	14.18	11.725	.493	.839
Providing Product Specification to Suppliers	14.13	10.228	.662	.795

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Design Product for Reuse/Recycle	18.15	13.574	.572	.834
Design of Product Concidering Lifecycle Assessment	18.01	14.311	.642	.818
Design Process for Minimization of Waste	17.72	14.222	.598	.826
Designs products with eco-friendly materials	17.97	14.193	.596	.826
Designs products for reduced material consumption	17.92	13.321	.693	.807
Designs production process for reduced energy usage,	17.90	14.040	.679	.811

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Utilizes environment-friendly packages	13.76	9.966	.622	.750
Uses recyclable/ reusable packaging materials	14.04	9.234	.594	.759
Make a continuous effort to find new reusable materials for packaging	13.87	10.402	.571	.765
Focuses on elimination of hazardous materials from packaging	13.53	9.192	.642	.741
Focuses on reduction of packaging weight	13.43	10.567	.491	.788

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency	14.03	8.587	.530	.744
Focuses on the use of green transport mechanisms	14.52	8.537	.531	.744
use a good information system and innovative management for efficient loading, scheduling and routing	14.21	9.057	.471	.762
sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.	14.19	8.223	.647	.704

locate near customers to reduce resources consumed in getting the product to them	14.11	8.501	.580	.727

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Install collection points for used products and packaging for reuse and recycling	13.08	11.246	.624	.816
Employ individuals or firms to collect waste generated by the firm's products.	13.18	11.272	.654	.808
Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products	13.10	11.200	.659	.807
Safe disposal of unrecyclable or unreusable waste (especially hazardous waste)	12.80	11.724	.596	.823
Put in place a system to monitor reverse flow of materials	13.05	11.056	.702	.795

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Decreased cost for materials purchased	50.42	102.716	.619	.932
Decreased in cost for energy consumption	50.52	104.706	.535	.934
Decreased in fee for waste treatment and discharge	50.41	99.706	.666	.931
Increase in revenue from green products/ services	50.27	104.033	.498	.935
Profits growth	50.17	101.104	.643	.931

Improvement in investments on social projects (education, culture, sports)	**50.44**	**97.997**	**.716**	**.929**
maintain or improve health and quality of communities in surrounding areas	**50.40**	**97.788**	**.739**	**.928**
maintain or improve health and safety of workers and consumers	**50.29**	**98.309**	**.764**	**.928**
Enhanced employee job satisfaction	**50.37**	**98.556**	**.793**	**.927**
enhances self-reliance of workers	**50.42**	**99.859**	**.735**	**.929**
Reduction in air emission	**50.38**	**100.373**	**.694**	**.930**
Reduction in waste (water/solid)	**50.20**	**101.708**	**.679**	**.930**
Decreased consumption for hazardous/harmful/toxic materials	**50.26**	**101.420**	**.700**	**.930**
Decreased frequency for environmental accidents	**50.36**	**102.165**	**.645**	**.931**
Improve a company's environmental situation	**50.27**	**101.626**	**.695**	**.930**

Descriptive results of SSCMP and Sustainable performance

Green Procurement Practices	Mean	Std. Deviation
Selecting Environmentally Friendly Suppliers	3.65	0.964
purchasing Environmentally Friendly Materials	3.65	0.916
Suppliers ISO Certification Requirements	3.61	1.003
Purchasing Materials that promote Recycling	3.62	0.928
Providing Product Specification to Suppliers	3.63	1.007
Overall	**3.632**	**0.75690**

Sustainable Design Practices	Mean	Std. Deviation
Design Product for Reuse/Recycle	3.46	1.059
Design of Product Considering Lifecycle Assessment	3.66	0.885
Design Process for Minimization of Waste	3.85	0.906
Designs products with eco-friendly materials	3.59	0.917

Designs products for reduced material consumption	3.7	0.983
Designs production process for reduced energy usage,	3.72	0.874
Overall	**3.66**	**0.70377**

Sustainable Packaging Practices	Mean	Std. Deviation
Utilizes environment-friendly packages	3.47	0.914
Uses recyclable/ reusable packaging materials	3.26	1.086
Make a continuous effort to find new reusable materials for packaging	3.41	0.903
Focuses on elimination of hazardous materials from packaging	3.71	1.038
Focuses on reduction of packaging weight	3.77	0.938
Overall	**3.524**	**0.73477**

Sustainable Distribution Practices	Mean	Std. Deviation
Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency	3.76	0.961
Focuses on the use of green transport mechanisms	3.35	0.985
use a good information system and innovative management for efficient loading, scheduling and routing	3.63	0.934
sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.	3.65	0.91
locate near customers to reduce resources consumed in getting the product to them	3.74	0.925
Overall	**3.626**	**0.69645**

Sustainable Reverse Logistics Practices	Mean	Std. Deviation
Install collection points for used products and packaging for reuse and recycling	3.35	1.067
Employ individuals or firms to collect waste generated by the firm's products.	3.3	1.033
Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products	3.34	1.015
Safe disposal of unrecyclable or unreusable waste (especially hazardous waste)	3.64	1.006
Put in place a system to monitor reverse flow of materials	3.4	1.01
Overall	**3.406**	**0.81463**

Sustainable Performance Practices	Mean	Std. Deviation
Decreased cost for materials purchased	3.58	0.889
Decreased in cost for energy consumption	3.54	0.862
Decreased in fee for waste treatment and discharge	3.63	1.007
Increase in revenue from green products/ services	3.73	0.928
Profits growth	3.83	0.966
Improvement in investments on social projects (education, culture, sports)	3.56	1.045
maintain or improve health and quality of communities in surrounding areas	3.62	1.04
maintain or improve health and safety of workers and consumers	3.7	1.001
Enhanced employee job satisfaction	3.65	0.945
enhances self-reliance of workers	3.55	0.948
Reduction in air emission	3.63	0.927
Reduction in waste (water/solid)	3.78	0.877
Decreased consumption for hazardous/harmful/toxic materials	3.73	0.878
Decreased frequency for environmental accidents	3.64	0.904
Improve a company's environmental situation	3.72	0.874
Overall	**3.65933**	**0.67377**