Exploring Sustainable Supply Chain Management in the Ethiopian coffee industry: an analysis of the critical factors, practices, and outcomes

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ABSTRACT

Global agrifood supply chains are under increasing pressure from consumer organizations, environmental advocacy groups, and policymakers to address sustainability concerns. Similarly, the supply chains in developing countries, such as the Ethiopian coffee industry, are compelled to ensure the production of their agricultural products is environmentally and socially substantiable. Thus, there is a growing interest in adopting sustainable supply chain management (SSCM), however, the implementation of sustainability initiatives is challenging. As a result, many organizations are facing difficulty integrating sustainability initiatives into agrifood supply chains. Moreover, most of the empirical studies on SSCM are carried out in developed countries from the perspective of buyers. Hence, the perspectives of producers and suppliers in developing countries in literature are found to be limited. Due to the slow adoption pace of SSCM in emerging economies and developing countries, the field of study is still in its infancy stage. Even though there are some studies conducted in developing and emerging countries, more SSCM studies are needed in similar countries to identify trends and pathways and implement sustainable initiatives.

As a result, a plethora of researchers are calling for more research concerning SSCM in developing countries to increase generalizability and inclusivity on a global scale. Consequently, to understand the changing aspects of SSCM more empirical research is required to be undertaken in developing countries such as Ethiopia. Therefore, this study intends to fill this gap, questioning how critical factors such as drivers, enablers, and barriers affect the adoption of SSCM practices. Moreover, the outcomes of environmental and social sustainability adoption have not been explored with respect to their associated drivers, enablers, and barriers constituting an additional knowledge gap. Consequently, this study was intended to accomplish two main objectives of determining the impact of critical factors in the adoption of SSCM practices and examining whether the adoption of SSCM practices can affect the performance of implementing firms.

In light of the aim of research, this study intends to develop a comprehensive conceptual framework with a focus on the determinants, SSCM practices, and outcomes, relating theoretical linkages between critical factors to adopt SSCM initiatives, the implementation of SSCM practices, and corresponding performance outcomes. The determinant critical factors include drivers, enablers, and barriers to adopting SSCM initiatives; the SSCM practices

encompass environmental and social sustainability practices, and the performance outcomes are measured using environmental, social, and economic indicators. To accomplish the main objective of the study and address the research questions, primary data was collected through delivery and collection questionnaires from 202 firms in the Ethiopian coffee industry. The reliability and validity of the proposed conceptual model were thoroughly assessed using relevant analytical statistical tools. In addition, to test the postulated hypotheses involving the theoretical relationship between critical factors, SSCM practices, and performance outcomes, Patial Least Square Structural Equation Modelling (PLS-SEM) was used.

The set of critical factors, which includes drivers, enablers, and barriers, was found to have a significant impact on the adoption of SSCM practices. Furthermore, the empirical findings show that the implementation of SSCM practices has a significant effect on the environmental, social, and economic performance of firms implementing SSCM. This study is expected to contribute to the existing knowledge of SSCM by advocating that the driving forces can only take SSCM adoption to a limited extent; in addition, enablers are also vital to the successful implementation of SSCM practices. Moreover, it is crucial to understand that barriers pose challenges by obstructing the integration of SSCM practices. The study confirmed that the implementation of SSCM practices resulted in improved environmental, social, and economic performance. The study has developed and validated a comprehensive conceptual framework which is instrumental to integrate SSCM into the Ethiopian coffee industry and similar agrifood supply chains. This study offers helpful insights to regulators and policymakers who are interested in advancing the SSCM initiatives, as well as managers who want to implement SSCM practices. Business managers are offered a validated conceptual framework, which is very useful for assessing how the adoption of SSCM practices affects organizational performance in terms of environmental, social, and economic indicators.

Keywords: Sustainable Supply Chain Management, Drivers, Barriers, Enablers, Sustainable practices, Performance outcomes, Ethiopian coffee.

LIST OF ABBREVIATIONS

AVE: Average Variance Extracted
BAR: Barriers
BCa: Bias corrected and accelerated
CB-SEM: Covariance Based Structural Equation Modelling
CFA: Confirmatory Factor Analysis
CSR: Corporate Social Responsibility
DEFRA: Department for Environment, Food, and Rural Affairs
DRI: Drivers
ECA: Ethiopian Coffee Association
ECX: Ethiopian Commodity Exchange
EFA: Exploratory Factor Analysis
ENA: Enablers
EMS: Environmental Management System
ESP: Environmental Sustainability Practices
GSCM: Green Supply Chain Management
HTMT: Heterotrait-monotrait
IOC: International Coffee Organization
ISO: International Organization for Standardization
KMO: Kaiser-Meyer-Olkin
LM: Linear regression Model
MAE: Mean Absolute Error
NGO: Non-governmental Organization
OLS: Ordinary Least Square
OSP: Outcomes of Sustainability Practices
PLS-SEM: Partial Least Square Structural Equations Modelling
RMSEA: Root Mean Square Error of Approximation
SC: Supply Chain
SCM: Supply Chain Management
SDGs: Sustainable Development Goals
SPSS: Statistical Package for the Social Sciences
SSCM: Sustainable Supply Chain Management
TBL: Triple Bottom Line
UN: United Nations
UNIDO: United Nations Industrial Development Organization
USDA: United States Department of Agriculture
VIF: Variance Inflation Factor
WCED: World Commission on Environment and Development

DECLARATION

The candidate declares that no portion of the work referred in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

RESEARCH PUBLICATIONS AND PRESENTATIONS

Peer-reviewed article publication

Habib, A. M., Ren, J., Matellini, B., Jenkinson, I., & Paraskevadakis, D. (2024). Critical factors to adopt sustainable agrifood supply chain management in developing countries: The case of Ethiopian coffee industry. Business Strategy & Development, 7(4), e70032. https://doi.org/10.1002/bsd2.70032

Conference paper presentations

1. Habib, A. M., Ren, J., Matellini, B., Jenkinson, I., & Paraskevadakis, D. (2022). A Systematic Literature Review on Adoption of SSCM in the Agrifood Supply Chain. CARISCA, Supply Chain Research Summit, June 28-30, 2022, Kumasi, Ghana.
2. Habib, A. M., Ren, J., Matellini, B., Jenkinson, I., & Paraskevadakis, D. (2022). Brief overview of the Ethiopian Coffee Supply Chain: Characteristics, Prospects and Challenges. 4th African Conference on Operations and Supply Chain Management, 27-28 July 2022, Nairobi, Kenya.
3. Adem M. Habib and Abadi A. Gugusa (2023). Redesigning Tigray Region's Pharmaceutical Supply Chain Distribution Network: in a Post-War Context. 5th African Conference on Operations and Supply Chain Management, 5-6 September 2023, Kampala, Uganda.

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DEDICATION

I dedicate this thesis to my late parents, Rahmetu Abdu and Mohammed Habib Adem.

CHAPTER ONE: INTRODUCTION

1.1 Overview

This chapter presents the background of the research with justifications to carry out the study, the research questions, and the objectives of the research. Moreover, the scope and delimitation of the research, which comprises the sectoral and geographical area, and the significance of the research covering the academic and practical contributions are discussed. Furthermore, the study's research methodology, including its philosophical and methodological perspectives, are introduced. Finally, the overall structure of the research as well as the chapter summary is presented.

1.2 Background and Justification

The main objective of the traditional supply chain is to maximize the profit of partners in the supply chain by minimizing the cost. However, nowadays due to growing awareness consumers and the community at large, it is becoming evident that businesses must modify their traditional approach to attain sustainability (Roy, Silvestre and Singh, 2020). To craft a sustainable supply chain, it requires a profound understanding of transition from traditional to sustainable supply chains (Pagell and Shevchenko, 2014; Kitsis, 2018). Moreover, to be sustainable, a balance must be struck between economic growth, environmental conservation, and social conditions (Allaoui et al., 2018). This move towards sustainability has previously happened in reaction to environmental regulations as well as heightened environmental consciousness among customers who demanded environmentally friendly goods and services (Brandenburg et al., 2014). The main objective of sustainable supply chain management (SSCM) is to incorporate social and environmental dimensions with economic considerations into the forward and reverse supply chains (Roy, Schoenherr and Charan, 2018a). Consequently, SSCM, which encourages sustainable production, has emerged as a crucial subject in both the academic and industrial contexts (Esfahbodi, Zhang and Watson, 2016).

Awareness regarding sustainability is increasing and it is important to make sure that supply chain operations are sustainable. The World Commission on Environment and Development (WCED) has given the most often quoted and most adopted definition of sustainability: ‘‘meeting the needs of the current generations without compromising the ability of the future generation to meet their own needs’’(WCED, 1987a; Chen and Kitsis, 2017). It is commonly

acknowledged that the WCED's comprehensive definition of sustainable development incorporates social, environmental, and economic goals, constituting environmental sustainability,social sustainability and economic sustainability (Rogers, Jalal and Boyd, 2012). As illustrated by Brandenburg, Gruchmann and Oelze (2019), SSCM research has gained acceptance by academia and industry in the past 15 years. However, most of the empirical studies on SSCM are carried out in developed countries from the buyer's perspective (Jia et al., 2018). Accordingly, the viewpoints of suppliers in developing countries in the literature are found to be limited. Therefore, SSCM research in the future should give more attention to developing countries from suppliers' perspectives (Esfahbodi, Zhang and Watson, 2016; Geng, Mansouri and Aktas, 2017; Jia et al., 2018). Due to the slow adoption pace of SSCM in emerging economies, the field of study is still in its infancy stage (Khan et al., 2021). Even though there are some studies conducted in developing and emerging countries such as Brazil, China, India, Malaysia, and South Africa, more SSCM studies are needed in similar countries to identify trends and pathways and implement sustainable initiatives (Jia et al., 2018). Moreover, researchers such as Ben Brik, Mellahi and Rettab (2013) and Esfahbodi, Zhang and Watson (2016), have called for more research concerning SSCM in developing countries to increase generalizability and inclusivity at a global scale. Consequently, to understand the changing aspects of SSCM more empirical research is required in developing countries (Jia et al., 2018). In general, Pagell and Shevchenko (2014), concluded that even though the research on SSCM has made a significant advancement, the field of study has a long way to go.

The outcomes of SSCM in developing countries are under researched because there is limited data available directly from suppliers. Hence, more research is required to conclude regarding the relationship between sustainability practices and their outcomes (Jia et al., 2018). Different industries are subject to different types of sustainability challenges and therefore have different approaches to sustainability. Hence, there is a need for industry specific SSCM research to be undertaken in developing countries (Jia et al., 2018). As per Ageron, Gunasekaran and Spalanzani (2012), and Seuring and Müller (2008), the manner in which organizational innovations and policies in supply chain management are considered in the context of sustainable development is referred to as a Sustainable Supply Chain.

It is critical to address sustainability in the agrifood supply chain since it has significant environmental and social consequences (Allaoui et al., 2018). Agriculture and food

consumption are two of the most major causes of environmental challenges such as habitat change, climate change, water use, and toxic emissions, according to the United Nations Environment Program's International Resource Panel in 2010 (Allaoui et al., 2018). Most studies on SSCM usually focus on environmental sustainability issues, mainly because there is greater consensus among researchers on environmental sustainability best practices, unlike social sustainability practices (Jia et al., 2018; Carter et al., 2020). Therefore, it is time to undertake more research to address both social and environmental sustainability issues.

Coffee is one of the agricultural commodities produced in developing countries such as Brazil, Vietnam, Colombia, Indonesia, and Ethiopia. For Ethiopia coffee is source of employment, income and hard currency. The coffee value chain is very complicated, with numerous production phases and a significant number of stakeholders, from farmers to consumers, who participate in the process (Marescotti and Belletti, 2016). It is a multi-billion-dollar worldwide industry with thousands of enterprises and millions of farmers, the majority of whom are smallholders (Daviron and Ponte, 2005; Samper and Quiñones-Ruiz, 2017). Based on studies conducted on the global value chain and its vertical integration, among the social problems identified is found to be from the "win-lose" relationship, in which big business always win and small producers always lose (Oya, 2012). Big businesses are the dominant actors who determine the price of coffee, and the famers are price takers.

As a result, the margin for the downstream segment of the global value chain has increased. As per Voora et al. (2019), around 70% of the world's coffee production was exported in 2017 earning USD 19 billion, while the coffee retail sector brought in USD 83 billion. For example, in 2018, Ethiopian farmers were selling a kilogram of coffee beans for USD 0.29 while the average price of regular cup of coffee cappuccino in the U.S. in early 2019 was around USD 4.0 (Kshetri, 2021). According to Daviron and Ponte (2005), this situation is described as the ‘Coffee Paradox’, is a predicament in which the price for farmers is plummeting and unstable on the one hand, while consumer prices are increasing on the other. The global coffee market has changed from being dominated by producers in the upstream segment to a market dictated by buyers (Gereffi, Humphrey and Sturgeon, 2005; Rueda and Lambin, 2013).

As per Van Rikxoort et al. (2014), in the coffee industry, there is an increasing interest in producing coffee that is climate-friendly, but there is disagreement on what exactly this entails. As a result, there is a quest for sustainability in the coffee supply chain, yet there is a lack of knowledge on how sustainability in the coffee supply chain actually works (Guimarães

et al., 2022). It is important to address sustainability in the agriculture supply chain since it has significant environmental and social consequences (Allaoui et al., 2018). Analyzing the sustainability of coffee supply chains needs determination and application acceptable and meaningful criteria. Moreover, the criteria should be customized based on the specific location on socioeconomic and ecological characteristics of the study area (Hayati, Ranjbar and Karami, 2010). Therefore, this study will explore the SSCM practices of the Ethiopian coffee supply chain and propose a novel conceptual framework for creating and maintaining a sustainable agribusiness supply chain.

Furthermore, public awareness regarding the importance of having nutritious and environmentally friendly food products is growing, providing incentives for most agrifood companies to focus on enhancing the sustainability of their supply chains (Matopoulos et al., 2007; Dania, Xing and Amer, 2018).

In the mid-1960s, reflections and discussions led to the development of sustainability. These mobilizations required the quantitative and qualitative maintenance of environmental resource stocks, as well as their usage without jeopardizing their sources or reducing their future supply ability, in order to meet both current and future needs (Sehnem and Oliveira, 2017). Elkington (2011) developed the phrase Triple Bottom Line (TBL) in the business world, which refers to analyzing a company's financial, social, and environmental performance over time. Managers need to consider the whole cost of conducting business in this manner. As a result, companies must quantify the value they create or destroy at the economic, social, and environmental levels from a TBL perspective (Sehnem and Oliveira, 2017). Organizations must incorporate sustainability policies and guidelines from the strategic to the operational level to become sustainable, providing assistance to society and going against traditional management, which is typically geared toward the interests of partners and based solely on economic development (Sehnem and Oliveira, 2017). It is critical to understand that no organization can exist without financial resources. When it comes to sustainability, however, this perspective extrapolates from an economic perspective, involving concern for citizens' quality of life, environmental development, the community in which the organization is embedded, encompassing culture, politics, human and ecological capital, and respect for the principles of equity and democracy (Sehnem and Oliveira, 2017).

Sustainability leads to a bottom-up strategy for resource savings, a strategy to reach out to a new consumer base, and a strategy to win, maintain, and enhance the status of employees,

customers, and their community when properly planned and implemented (Sehnem and Oliveira, 2017). The participation of small farmers and other producers in these demanding sourcing networks, as well as institutional measures that assist them fulfill the severe food safety and quality rules, are major concerns on the sustainable development agenda (Naik and Suresh, 2018). The fundamental rationale for implementing sustainable practices is that organizations that successfully handle environmental and social concerns can generate more business prospects than their competitors (Li et al., 2014). This is also consistent with the findings of other research on green supply chain management (Zhu and Sarkis, 2004; Rao and Holt, 2005; Li et al., 2014).

Ethiopia is one of the developing countries that produce and sell coffee. Coffee in Ethiopia is a source of foreign exchange and significant employment opportunity. Considering the importance of the commodity to the national economy, the Ethiopian government has planned to increase the production and productivity of coffee significantly within five years (2016 to 2020). According to the Ethiopian NPC (2016) the productivity of coffee is projected to increase from 7.48 quintal per hectare in 2014/15 to 11 quintal per hectare by 2019/20. In addition, the total production is expected to increase from 420 thousand tons in 2014/15 to 1045.05 thousand tons by 2019/20. However, the production of coffee and the farming area coverage in the past six years (2015/16 to 2020/21) has increased on average by 40% and 30% respectively. Besides, in the harvesting year of 2023/24 Ethiopia has produced 8.35 million 60 kg bags of coffee which accounts 6% of total production of coffee in the word (USDA, 2024). However, this ambitious move to boost the productivity and production of coffee only focuses on the economic benefits and disregards the environmental and social perspectives. It is mainly concerned with increasing the economic paybacks for the actors in the coffee supply chain and foreign exchange for the country. The Ethiopian coffee industry has a lions share in generating hard currency for the country. The coffee industry is generating hundreds of millions of dollars annually and the government is working to increase the hard currency to obtain from the export of the commodity. Economic sustainability is essentially the pursuit of conventional economic goals while considering their effects on society and the environment.

Despite the vast and pushy plan to increase production and productivity, so far little attention is given by researchers to investigate its impact on the coffee supply chain. Some studies are conducted on the Ethiopian coffee supply chain and mainly to provide general information

about the coffee sector. For example, Beshah, Kitaw and Dejene (2013) have carried out value chain analysis focusing on output quality. Minten et al. (2015a) have examined changes and their drivers in the upstream part of the coffee value chain. Duguma (2017) conducted research to identify the opportunities and constraints within the coffee chain. More comprehensive research works, however, need to be conducted to shed light on the sustainability perspectives of the Ethiopian coffee supply chain management. Hence, this study focuses on the environmental and social sustainability dimensions of the SSCM.

In addition, according to Brandenburg, Gruchmann and Oelze (2019), the SSCM has room for future research and thus needs more conceptual development and theoretical foundation. Analyzing the sustainability of coffee supply chains needs determination and application acceptable and meaningful criteria. Moreover, the criteria should be customized based on the specific location on socioeconomic and ecological characteristics of the study area (Hayati, Ranjbar and Karami, 2010). Besides these as per Martins and Pato (2019), it is confirmed that more of the previous studies have been focused upon systematic literature reviews while industry specific studies are still not carried out much. Therefore, this study will explore the SSCM practices of the Ethiopian coffee supply chain and propose a novel conceptual framework for creating and maintaining a sustainable agribusiness supply chain.

The results of this study are expected to provide valuable perspectives to scholars and policymakers for several reasons. Primary, there are few sustainability studies that have been empirically tested with an integrated viewpoint, i.e., considering critical factors, the social and environmental sustainability practices, and performance results. This is because most scholars tend to focus on either the social or environmental sustainability perspectives (Baliga, Raut and Kamble, 2019). Next, according to a literature review by Panigrahi, Bahinipati and Jain (2019), there is still uncertainty regarding whether a firm's economic performance is directly related to its adoption of sustainable practices, or whether those firms that are performing well have adopted these practices. Third, sustainability studies from developing countries in Africa such as Ethiopia are scarce. Therefore, possibly this research can help practitioners, policy makers and researchers to address these gaps.

1.3 Research aim and questions

The aim of the research is to analyze the SSCM (SSCM) practices of the Ethiopian coffee industry and to propose a comprehensive conceptual framework to facilitate the

implementation of sustainability in coffee supply chains. To accomplish the research aim, the following research questions (RQ) need to be answered:

RQ1: What are the critical factors that determine the adoption of SSCM practices?

RQ2: What impact does the implementation of SSCM practices have on the performance of the firm?

RQ3: How can SSCM practices be integrated in the Ethiopian coffee supply chain?

1.4 Research Objectives

To answer the research questions stated above, the following project objectives have been set:

RO1: To identify the critical factors that determine the adoption of SSCM initiatives in the Ethiopian coffee supply chain.

RO2: To elucidate the environmental and social sustainability practices in the Ethiopian coffee industry.

RO3: To explore the performance outcomes of the implementation of SSCM practices.

RO4: To develop a comprehensive conceptual framework to integrate SSCM practices.

RO5: To validate the proposed conceptual framework with empirical survey.

1.5 Scope of the study

The study is designed with the purpose of investigating the impact of critical factors which include drivers, enablers, and barriers, on the adoption of environmentally and socially sustainable practices. Moreover, it also intends to examine the environmental, social, and economic outcomes as a result of the implementation of SSCM practices.

Specifically, the conceptual scope of the study can be described as follows:

- To examine the impact of drivers, enablers, and barriers on the adoption of SSCM practices in the Ethiopian coffee SC.
- To investigate the effect of the adoption of SSCM practices on the environmental, social, and economical performance outcomes of the Ethiopian coffee SC.

1.6 Delimitation of the study

In this section, the boundaries of the research with regards to the sector and the geographical area are discussed as follows:

1.6.1 Sectoral area

The research focuses on the agricultural supply chain in general and specifically on the Ethiopian coffee supply chain. The Ethiopian coffee industry, which is an important sector not only for the Ethiopian economy but also for the global agrifood supply chain. Coffee is the most traded commodity next to oil in the world. For Ethiopia coffee is a source of foreign exchange and employment opportunity. It is an important agent of development, generating income for thousands small-holder farmers. Since coffee production and harvesting is labor-intensive, it is an important source of rural employment and income. As can be seen from Figure 1.1, the coffee supply chain includes activities such as coffee production, transport, and consumption. The coffee production is a broad activity carried out by many actors, for instance, coffee growers, harvesters, primary and secondary processers. The focus of the study is the production of coffee which includes growing, harvesting, primary and secondary processing as well as the transportation from the production place to the port of export. These activities are elements of the upper stream part of the coffee supply chain undertaken in Ethiopia.

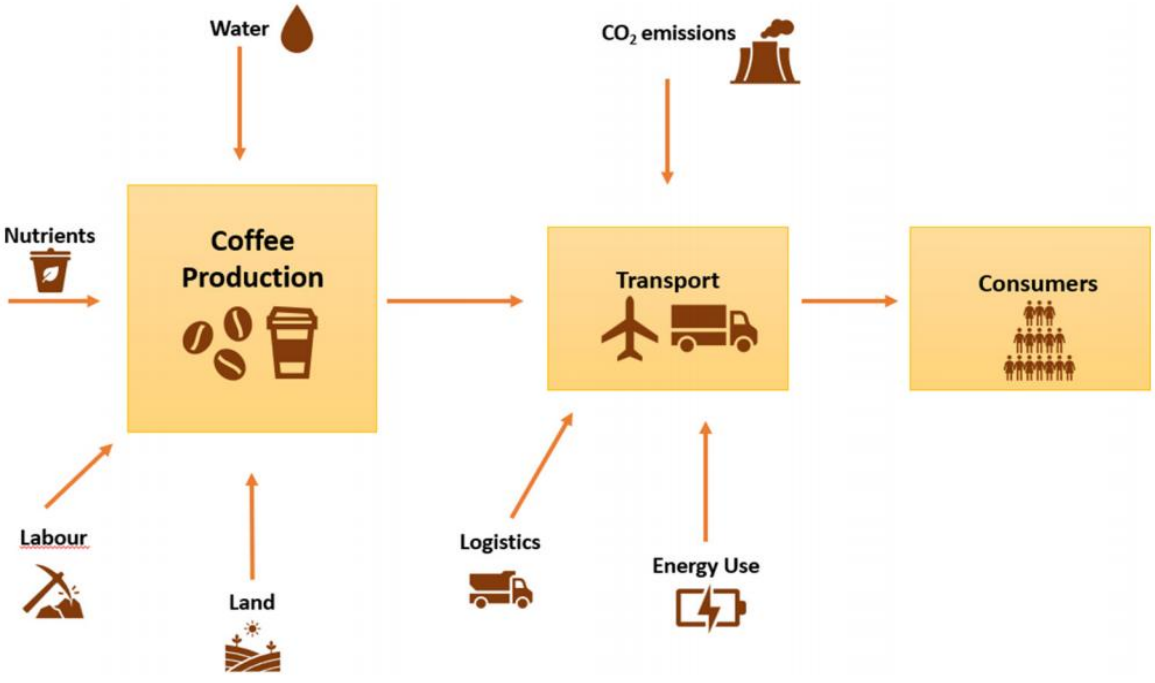


Figure 1.1: The coffee supply chain and sustainability aspects
Source: Guimarães et al. (2022, p.44)

1.6.2 Geographical area

The geographical scope of this research is Ethiopia. Ethiopia is the largest producer of Arabica coffee in Africa and the historical origin of Arabica coffee. Ethiopia has a broader assortment than any other coffee-producing country, with 24 approved kinds of the Arabica coffee that varies in taste, size, color, and quality (UNIDO, 2015; Garo, Shara and Mare, 2016). Furthermore, the country is known for producing high-quality coffee, which might help to improve sales (UNIDO, 2015). The majority of Ethiopian coffee is organic, since most coffee farmers do not use agrochemicals on their soil (Tefera and Tefera, 2014; Minten et al., 2019). This boosts Ethiopian coffee's desirability and competitive advantage in the international market, particularly in specialty coffee (Tefera and Tefera, 2014; UNIDO, 2015). Ethiopia is the biggest exporter of organic coffee from Africa (Minten et al., 2015b). The coffee SC in Ethiopia includes the typical stages such as input supply, production, primary marketing, primary processing, trading, green coffee exporting, and secondary processing (Beshah, Kitaw and Dejene, 2013).

Smallholder coffee growers or commercial farms, primary collectors, suppliers, processors, cooperatives, exporters, and other governmental entities are some of the stakeholders involved in the coffee supply chain (Beshah, Kitaw and Dejene, 2013). The actors engaged in coffee can be direct or supporting actors. Farmers, processors, cooperatives, the Ethiopian Commodity Exchange, exporters, distributors, and retailers are some of the direct actors who directly add value to coffee production. Whereas the supporting actors provide support in the value creation of the product and can be governmental institutions, associations, research institutions, and NGOs (Gashaw, Habteyesus and Nedjo, 2018).

1.7 Significance of the study

This study intends to contribute to and build upon the existing knowledge on SSCM, specifically in terms of its determinant critical factors, SSCM practices, and the impact on firms' performance outcomes. The academic and practical significance of this study are respectively presented.

1.7.1 Academic significance

The research is conducted in one of the developing countries in Africa, Ethiopia, which is expected to fill the missing representation of developing countries in the SSCM literature. Thus, it helps to have a deeper understanding regarding the concept of SSCM, determinants,

practices, and outcomes in the context of developing countries and contributes to addressing global sustainability issues with a more inclusive approach.

One of the limitations of the SSCM literature is the absence of suppliers' perspective, especially from developing countries, because most of the studies are undertaken in the developed countries with buyers' viewpoints. Hence, this research is expected to contribute to the existing knowledge through the empirical survey carried out by collecting data from suppliers in one of the developing countries.

Even though most of the commodities are produced in different parts of the world with different contexts and commercialized all over the world. The existent literature in SSCM tends to be general and lacks industry specific contexts. Accordingly, this research intends to contribute to the existing literature within the agriculture industry context.

Most of the research undertaken so far usually focuses on environmental sustainability issues. However, to have an all-inclusive and comprehensive understanding with regard to SSCM, there is a need for more studies on social sustainability dimensions. Therefore, this research is conducted focusing on both environmental and social sustainability dimensions to complement the existing literature on SSCM.

Finally, another significant aspect of this study is its comprehensive and integrated viewpoint, which enables a thorough and rigorous empirical analysis of the determinants of SSCM, its effects of SSCM practices, and performance outcomes. Thus, this study adds to the body of knowledge on SSCM by conceptualizing a thorough SSCM determinants-practices-performance model by incorporating recently established constructs into a framework employing earlier fragmented and separated studies. It is therefore argued that this study has academic importance.

1.7.2 Practical significance

Generally, this research provides helpful insights for managers looking to implement SSCM practices as well as policymakers and regulatory authorities looking to promote the SSCM agenda. Agribusiness managers can also get guidance on how to implement SSCM practices and carry out environmental and social sustainability initiatives throughout their supply chain. The subject of SSCM is under researched in developing countries, specifically in Africa. As a result, this study is important from a managerial perspective because it offers empirical research-based knowledge on the determinants of SSCM, sustainability practices, and performance outcomes comprehensively from the Ethiopian coffee supply chain context.

The other practical significance of this study can be further extended because the research provides useful advice for agricultural supply chains operating in resource-constrained developing countries such as Ethiopia on how to transform their conventional supply chains into sustainable ones by minimizing environmental harm, ensuring social welfare, and enhancing performance.

The SSCM conceptual framework that has been validated in this work can assist agribusiness enterprises operating in Ethiopia and in developing countries to determine which parts of the supply chain need to be improved and how to prioritize their sustainability initiatives.

1.8 Research methodology

1.8.1 Research philosophy and research purpose

According to Taylor, Bogdan and DeVault (2015), the first task for any researcher is to examine the research philosophy, which primarily deals with knowledge development and assessment of the nature of that knowledge. The research philosophy chosen by any researcher is largely determined by the researcher's worldview. As pointed out by Wilson (2010), each researcher views a similar circumstance in a different way. As per Panneerselvam (2014), there are primarily two sorts of research philosophies: positivist research philosophy, which is also known as scientific, and interpretivist research philosophy, which is also known as anti-positivist. The reality is essentially assumed to be stable in the positivist research philosophy. The positivists believe that reality can be observed as well as described from an objective viewpoint, with the researcher having minimal contact with the research participants, requiring the researcher to be independent and detached. Therefore, considering the nature of the research, the researcher has applied positivist research philosophy. According to Brannen (2017), in order to conduct research, the researcher must choose between two approaches: the deductive approach and the inductive approach. As proposed by Robson (2002), there are five stages that should be followed to undertake deductive research. The researcher begins by formulating hypotheses, which is a theory testing process regarding the relationship between two or more variables or concepts. The researcher's duty in the second stage is to express the deduced hypothesis in operational terminology. The researcher should test the operational hypothesis in the third stage and see whether the theory applies to specific scenarios. In the fourth stage, the researcher will examine the specific findings of the research, i.e., the researcher will determine whether the findings confirm the theory or

whether any changes are required. The researcher will modify the theory based on the findings in the last stage. Hence, based on the nature of the research project, the researcher has employed a deductive approach combined with explanatory research in which empirical data will be collected to test a conceptual framework developed based on an extensive literature review.

1.8.2 Research method and research approach

Considering the main research objective of developing hypotheses and the research model, a quantitative survey was considered appropriate as it would facilitate the empirical examination of the hypotheses and research model. Besides, this study also used the deductive reasoning approach, which develops hypotheses from existing knowledge and tests them through empirical observations (Saunders, Lewis and Thornhill, 2023). In line with this approach, the causal relationship model was theorized by a thorough review of contemporary literature surrounding the research phenomenon, working from the general to the specific. Thereafter, a delivery and collection questionnaire survey were conducted to obtain the required data and information to test the proposed research hypotheses. The research model was then empirically assessed using the partial least squares structural equation modelling (PLS-SEM) method (Hair et al., 2021). Moreover, the PLS-SEM analysis was carried out to examine the proposed hypotheses regarding the relationships between the research constructs using PLSsmart software version 4.

1.9 Structure of the thesis

This section discusses the overall structure of this thesis in terms of the chapters and the main points presented within each chapter. This thesis is organized into seven chapters: introduction, literature review, conceptual development, methodology, analysis and results, discussions and conclusion. Figure 1.2 depicts the structure of the chapters in this thesis.

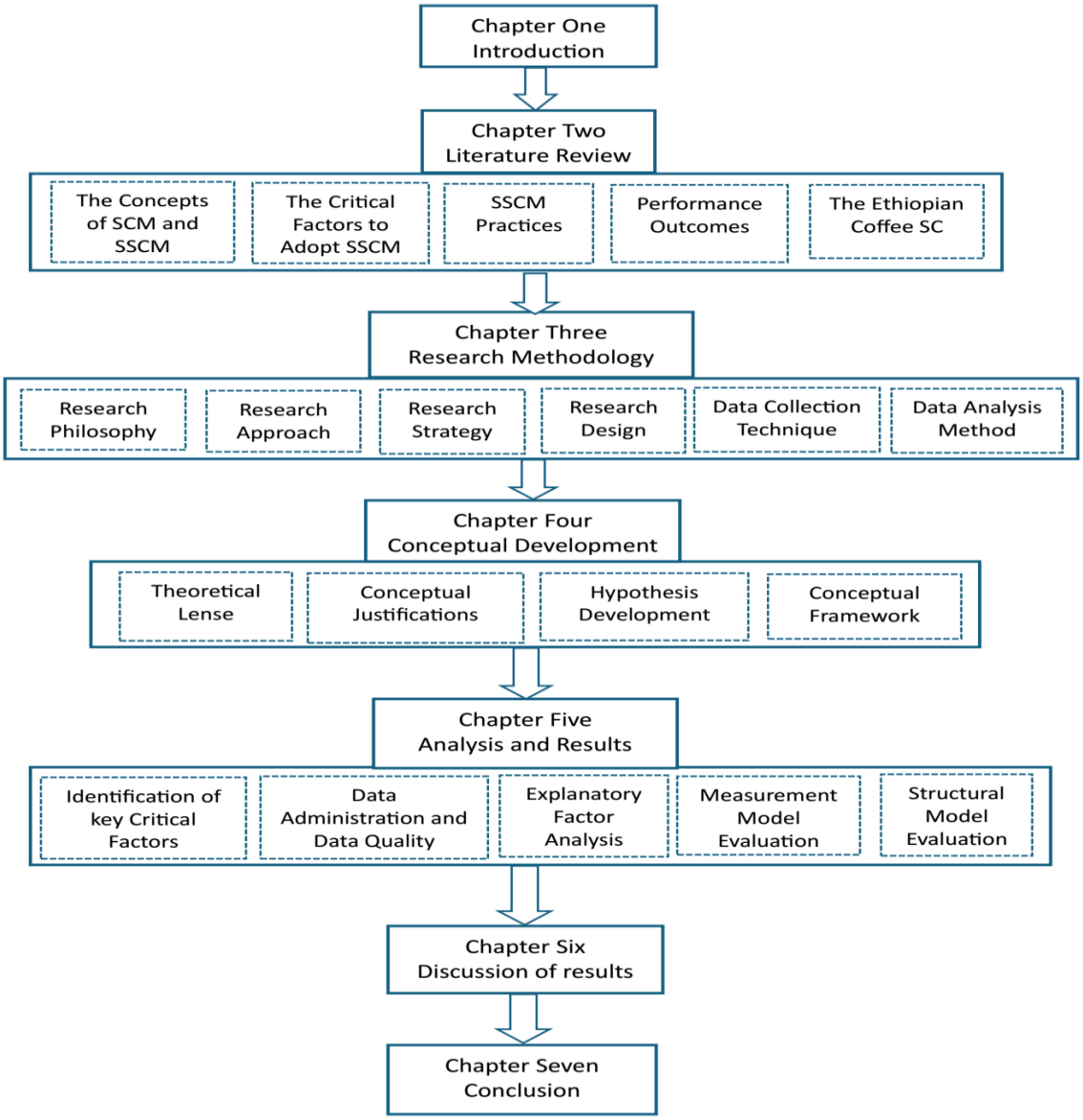


Figure 1.2: Structure of the thesis

Chapter 1: Introduction, it presented briefly the general overview of the chapter. The chapter begins by outlining the background theme of the study and presents the gaps in the body of existing literature. The scope of the study, research questions and objectives, scope and delimitation the research, including the sector and geographic area of examination, significance and relevance of the study are presented. Finally, the overall structure of the thesis and summary of the chapter are presented at the end of the chapter.

Chapter 2: Literature review, this part reviews the relevant literature surrounding the research topic and provides a theoretical background on the main research clusters covering the research phenomenon. This chapter begins with a brief theoretical background on the field of SCM andits key activities and processes and also addresses how SCM has shifted its

focus to sustainability. This is followed by an outline of the theoretical understanding of the SSCM concept along with its terminology and core components. The main research themes relevant to the research phenomenon are emphasized: critical factors, implementation of SSCM practices and its corresponding performance outcomes. Thereafter, this chapter presentstheoretical discussions on each of these research themes, providing a theoretical foundation on several segments of the research phenomenon. Accordingly, this chapter builds the critical factors that determine the adoption of SSCM initiatives, SSCM practices and SSCM performance research themes and develops their relevant dimensions. This synthesis of the main research themes enables this study to achieve its primary objective of developing a robust conceptual framework to effectively answer the research questions. Overall, this chapter attempts to provide the theoretical foundation for the integrated research phenomenon, and based on this foundation, the research framework is conceptualized.

Chapter 3: Research methodology, describes and justifies the core methodology used in this thesis, including the research philosophy, the research approach, the research strategy, the research design and the research method, creating the research roadmap of this thesis. This chapter goeson to present the questionnaire development in detail, including the choice of questionnaire and the design of the questionnaire structure. This is followed by the development of the measurement scale and the rationale for using primary data in this thesis. This chapter also discusses the sampling strategy adopted in this study along with the ethical considerations. The chapter concludes with details of the pilot study and the main survey.

Chapter 4: Conceptual development, discuss the integrated critical factors, SSCM practices, and performance paybacks model is presented. The chapter begins by describing the theoretical lenses applied in the research. The two organizational theories, institutional theory and stakeholder theory, used as theoretical lenses are presented. This chapter discusses the theoretical linkages between the three main research clusters of SSCM key critical factors, implementation of SSCM practices and performance outcomes. Besides, it discusses how the theoretical model was conceptualized with a focus on antecedents and outcome effects and how the research constructs were integrated. The chapter then presents the hypothesis development concerned with the effects of critical factors on the adoption of SSCM practices and the impact of SSCM practices on performance outcomes; and illustrates how each individual hypothesis was proposed. The chapter finishes with the presentation of the proposed conceptual framework of the research.

Chapter 5: Analysis and results, describes and justifies the proposed data analysis approach of simple descriptive statistics and the partial least square structural equation modelling (PLS-SEM) and contains the descriptive results of the research findings. This chapter presents the various analyses concerning the exploratory factor analysis, scaleassessment processes and measurement model assessment. The chapter then concludes with the PLS SEM results and also reports whether the proposed hypotheses are supported or rejected.

Chapter 6: Discussion of results, discusses the findings of the study. This chapter draws on the findings for each proposed hypothesis in detail, informed by the results. This chapter provides critical discussions with respect to the research questions, expounding on the causal relationships between the critical factors to adopt SSCM and implementation of SSCM practices, followed by discussing the theoretical relationships between SSCM implementation and performance outcomes. This chapter further discusses whether the findings of each of the hypothesized relationships are in line with existing studies and also explains the rationale where inconsistentresults exist. An overview of theoretical views of the critical factors-SSCM practice-performance elicited from this empirical investigation is then presented. The chapter finishes by addressing the noteworthy theoretical and empirical contributions of this thesis.

Chapter 7: Conclusion, revisits the research objectives and summarizes the answers to the research questions, concluding the findings of this study. This chapter also presents the study's main contributions along with the key managerial implications elicited from this research investigation. The chapter ends with the discussion of the limitations of the research and future research directions which provide further research opportunities.

1.10 Chapter summary

The background of the research phenomenon, the research gaps identified in the existing literature, the study's scope, key research questions, its primary objectives, and the research plan to successfully accomplish these objectives have all been covered in this chapter's overview of the research context. The presentation and discussion of the research topics and objectives have taken place. The Ethiopian coffee supply chain is both practically and theoretically significant in the research setting, as explained in the research delimitation. Furthermore, the value of the research has been examined from both an academic and practical perspective.

The researcher has explained why the selected research phenomenon merits empirical study at the doctoral level and how it can advance our understanding both theoretically and practically. Additionally, a brief explanation and justification of the philosophical and methodological positions taken in this thesis have been provided. Lastly, this chapter covered the key ideas discussed in each chapter and provided an illustration of the thesis's overall structure.

Overall, the aim of the introduction chapter was to lay the groundwork for this thesis. The following chapter will go over the idea of SSCM (SSCM) and its three pertinent research themes of the study, which are the critical factors, SSCM practices, and performance outcomes.

CHAPTER TWO: LITERARURE REVIEW

2.1 Overview

This chapter begins by presenting the process applied to undertake the literature review for the study. Then, it has described basic terms and concepts, the evolution and transition to SSCM, and the dimensions and core functions of SSCM. The chapter also discussed the nature, characteristics, and structure of the Ethiopian coffee supply chain. Moreover, the critical factors to adopt SSCM, the environmental and social sustainability practices, and the corresponding performance outcomes are discussed in detail.

2.2 The literature review process

Literature review is a requirement to make reasoned judgements about the value of each piece of work and to summarize, synthesize and organize those ideas and findings into a written product. According to Saunders, Lewis and Thornhill (2023), literature review is the process of obtaining and synthesizing previous research, generating well-reasoned judgements, and organising your ideas into a piece of writing. Research projects assessment criteria usually require the researcher to demonstrate awareness of the current state of knowledge in your subject, its limitations and how the proposed research project fits in this wider context. Hence, Snyder (2019, p.333) stated that 'building your research on and relating it to existing knowledge is the building block of all academic research activities, regardless of discipline'. This implies that researchers need to gather and critically examine published material that is pertinent to their area of study.

A written review needs to be structured and compiled in a manner that demonstrates the understanding of the researcher regarding the field of study and its key theories, concepts and ideas, as well as the major issues and debates about the research topic (Denyer and Tranfield, 2009). Therefore, the researchers need to show what relevant research has been published in the chosen area so far and, if possible, identify any other research that might currently be in progress. Business and management study draws from a diverse body of literature, unlike to certain other academic field of study. Certain business disciplines such as accounting, finance, operations, strategy, marketing, and human resource management are probably going to be included in the literature review, but it is also likely to cover other fields including economics, psychology, sociology, education, and geography (Saunders, Lewis and Thornhill, 2023). Hence, considering the significance of literature reviews for research, it is

essential to understand the meaning and the scope of a critical literature review before beginning the review process.

A critical literature review is expected to be a constructive critical analysis that establishes a compelling argument for what is known and unknown about a research question based on the available literature (Wallace and Wray, 2021). The researchers need to indicate and provide justification if they believe that the ideas, theories, arguments, or empirical research findings presented and discussed in an article are ambiguous, skewed, or incompatible with previous work and require additional investigation (Saunders, Lewis and Thornhill, 2023). This task is very crucial aspect of the literature review process; however, it is difficult and needs serious consideration. When the researcher begins to find, refer and evaluate the literature, the researcher must consider how to integrate the academic theories and research findings reviewed to construct the critical literature review that will be included in the research project report. In addition to evaluating previous research in the field of study, the review must demonstrate and elucidate the relationships between published research findings and cite the relevant literature. It will highlight the most important ideas and patterns; and present them logically, demonstrating how they relate to the research project. This will help the researcher to define the parameters of the research and give readers of the project report the background information they need to understand the questions and objectives and establish the boundaries of the research. To achieve this, though, the researchers must still read the literature, clearly state why they believe it needs to be revised and provide a convincing justification for their own beliefs and with reference to the literature.

As per Saunders, Lewis and Thornhill (2023), the following are important to note when composing the content of the critical review:

- To provide the main academic theories in the field of study that are relevant and contextualise the research questions.
- To demonstrate that the researcher has knowledge about the field of study.
- To make it easy for readers of the research project report to locate the original publications cited through complete and understandable referencing.

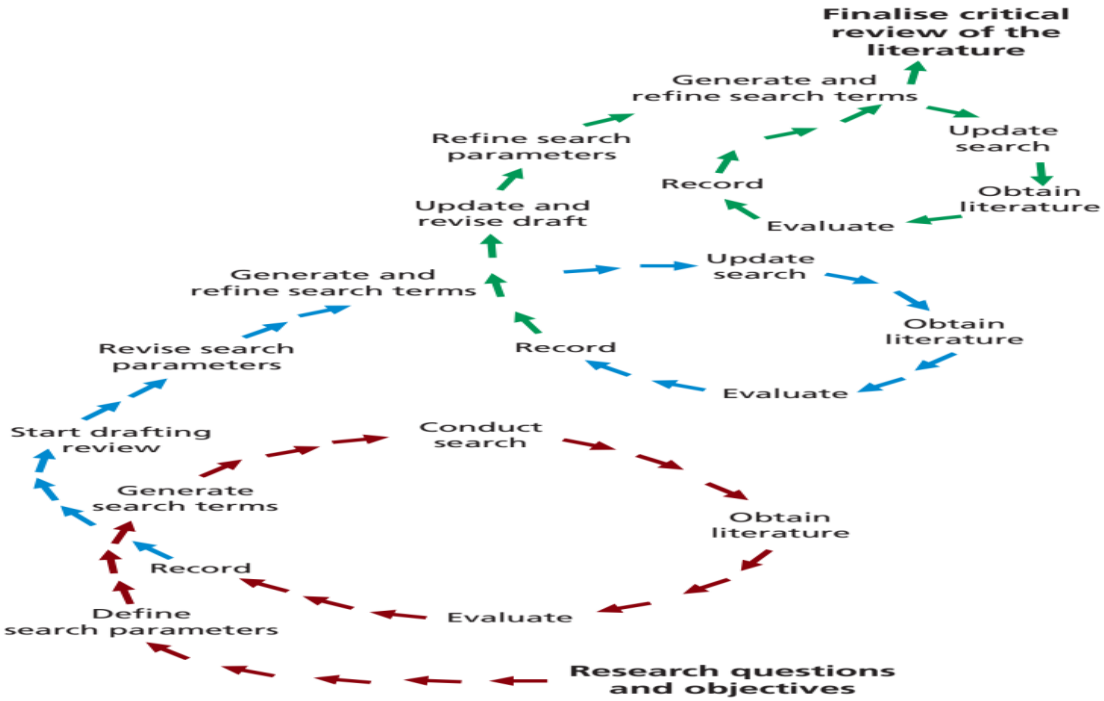


Figure 2.1: The literature review process
Source: Saunders, Lewis and Thornhill (2023).

2.3 Definition of basic terms and concepts

Before discussing the main theme of the research, it is better to define the basic terms because it will help us to understand and comprehend the concept of SSCM. The term supply chain appeared for the first time in the literature four decades ago when (Oliver and Webber, 1982) coined the first definition for the management of systemic activities. Since 1982, the field of supply chain management (SCM) has expanded significantly both at the research and industrial levels, and supply chains are now fundamental systems in every organization (Barbosa-Póvoa, da Silva and Carvalho, 2018).

Since then, the concept of supply chain has been described and defined differently by different authors and institutions. Some authors define it based on the core determinants of a good supply chain such as Beamon (1998, p.282), define it ‘’as an integrated manufacturing process wherein raw materials are converted into final products, then delivered to customers’’. Whereas others define it by considering the extra activities, for example, Mentzer et al. (2001, p.4) define it as ‘’ a set of three or more entities directly involved in the supply and distribution of flow of goods, services, finances, and information from a source to destination’’. However, this thesis adopts the definition given by Chen and Paulraj (2004), that describes supply chain as ‘a network of materials, information, and services processing links with the characteristics of supply, transformation, and demand ’.

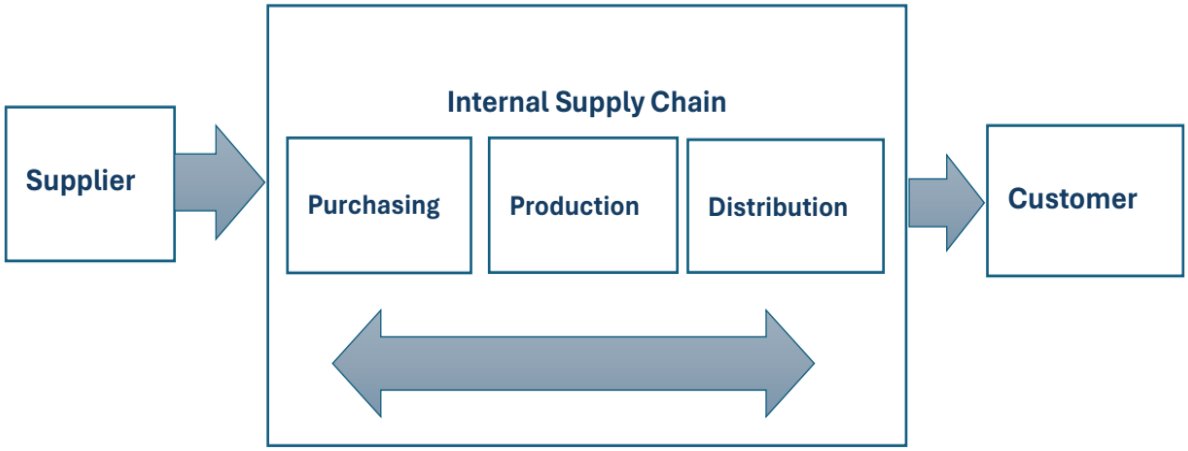


Figure 2.2: An illustration of a typical Supply Chain
Source: Chen and Paulraj (2004).

The development of SCM literature has been facilitated by several disciplines, including purchase and supply, logistics and transportation, marketing, operations management, organizational theory, management information systems, and strategic management (Chen and Paulraj, 2004). As a result, there is no commonly shared or nominal definition in the field of supply chain management (LeMay et al., 2017). This lack of consensus definition has made the field of supply chain management widely diverse (Ellram and Cooper, 2014). Supply chain management is defined by LeMay et al. (2017, p.1446) as ''the design and coordination of a network through which organizations and individuals get, use, deliver, and dispose of material goods; acquire and distribute services; and make their offerings available to markets, customers, and clients''.

Organizations are increasingly taking sustainability into account when making both long-term and short-term decisions because it is one of the most crucial themes in the field of supply chain management (Esfahbodi et al., 2017; Sánchez-Flores et al., 2020). SSCM is an essential tool in encouraging sustainability in organizations and a topic of interest in contemporary research (Carter and Washispack, 2018; Roy, Schoenherr and Charan, 2018b). The concept of SSCM (SSCM) has emerged out of the understanding that purchasing and supply activities have a strategic role in achieving long-term performance for an organization as well as in resolving sustainability challenges within business operations (Touboulic and Walker, 2015). According to the comprehensive definition given by Henderson and Loreau (2023) sustainability refers to '' the practices that allow the current population to meet their basic

needs, without jeopardizing the needs of future generations''. As per Brundtland, sustainability can be realized only when it stresses (a) the mitigation of deprivation and poverty; (b) the protection and improvement of the resources base, which alone can guarantee the permanent alleviation of poverty; (c) expansion of the idea of development, so that it covers economic growth as well as cultural and social development; and (d) a consideration of both economics and ecology in making decisions at all levels (Pearce, Markandya and Barbier, 1989). The topic of sustainable development has become commonly known in the last 30 years (Salvia et al., 2019). It has 17 goals representing a major accomplishment in the development of sustainable practices on a global level. Consequently, the business-as-usual practices will not result in a sustainable socio-ecological system and unconventional strategies are needed to uphold a balance between societal needs and the environment (Henderson and Loreau, 2023).

2.4 Evolution of SSCM

The twenty-first century brought with it a number of opportunities and challenges, on one hand, the development of the internet made the world a global village, which makes it easier for businesses to find new markets for their competitive products, on the other, environmental concerns pose a global challenge to manufacturers (Mardani et al., 2020). Now it is widely acknowledged in the literature and some researchers demonstrate the significant impact of supply chain management on the environment (Mentzer et al., 2001) and larger society (Linton, Klassen and Jayaraman, 2007).

The conventional definition of sustainability is using resources to satisfy current demands without compromising the ability of future generations to satisfy their own needs (WCED, 1987b). However, this description of sustainability is very general and ambiguous. Thus, when attempting to put the ideas of sustainability into practice, challenges frequently arise due to the ambiguities and vagueness that surround the definition (Ahi and Searcy, 2013).

In today's increasingly competitive market, supply chain management (SCM) has emerged as one of the key strategies used by businesses to reduce costs and improve economic performance (Hong, Zhang and Ding, 2018). As a result, SSCM has seen a substantial increase in interest recently in both the corporate and academic worlds; nevertheless, sustainable development in emerging nations has only recently begun to gain prominence (Sánchez-Flores et al., 2020). Thus, SSCM has emerged as one of the main topics of study in the field of

SCM (Carter et al., 2020). Furthermore, many businesses have adopted sustainable supply chain practises due to the quick changes in customer demand patterns, increased competition, and pressure from governments and other stakeholder groups (Kashmanian, 2015).

Figure 2.3: The evolution of SSCM

2.5 Green supply chain management versus SSCM

Rapid industrial development in recent years has had detrimental effects on the environment, including toxic pollution, chemical spills, and greenhouse gas emissions (Peng and Lin, 2008). Stakeholders are placing pressure on businesses to adopt green supply chain management (GSCM) practices to extend their environmental responsibilities (Payán-Sánchez, Pérez-Valls and Plaza-Úbeda, 2019). Moreover, companies are increasingly being held accountable for environmental damage caused by their supply networks (Al-Sheyadi, Muyldermans and Kauppi, 2019; Pinto, 2020; Silva et al., 2021). As a result, the concept of green supply chain management (GSCM) has risen, which takes sustainability factors and a mix of environmental thinking into account along the intra- and inter-firm management of the upstream and downstream supply chain, in response to the rising worldwide environmental awareness (Walker and Jones, 2012). The concept GSCM is described by Beamon (1999) as the extension of conventional supply chains to incorporate practices aimed at reducing environmental effects of a product throughout its life cycle, such as green design, resource conservation, the elimination of toxic materials, and product recycling or reuse. Due to pressure from numerous stakeholders, including government regulations, customers, purchasers, and the community

to reduce environmental problems, businesses are currently required to integrate environmental management into their supply chain(Mardani et al., 2020). GSCM practices include innovations in the acquisition, production, distribution, and logistics processes, thus, to implement supply chain greening successfully, businesses must make significant changes to their products, processes, and management, frequently accompanied by the adoption of new business models (Assumpção et al., 2022). When a business is capable of properly addressing environmental issues, more business opportunities can be generated by implementing GSCM (Mardani et al., 2020). Early sustainability initiatives tended to concentrate on environmental issues, but as time goes on, they are increasingly embracing a triple bottom line (i.e., environment, economic, and social) approach to sustainability (Ahi and Searcy, 2013). This environmental management strategy can help businesses realize their social obligation to improve environmental sustainability conditions and ensure that they are in compliance with environmental laws, removing the risk of fines and closure (Mardani et al., 2020). The concept of GSCM was born out of the environmental management principles from supply chain perspectives (Walton, Handfield and Melnyk, 1998). The actions of reverse logistics are directly connected to all areas of environmental management in the intricate value chain (Mardani et al., 2020).

According to Lintukangas, Hallikas and Kähkönen (2015), the terms "green supply chain management" and "SSCM" have been used interchangeably in the literature to describe the actions and choices businesses make while trying to acquire goods and services while taking care of the environment. Although several SSCM definitions significantly overlap with GSCM definitions, it is obvious that SSCM is primarily an expansion of GSCM (Ahi and Searcy, 2013). However, there is a distinction between the concepts green supply chain management and SSCM. Compared to SSCM definitions, those for green supply chain management were often more concentrated and heavily emphasized environmental concerns (Ahi and Searcy, 2013). It is obvious that SSCM is fundamentally an extension of green supply chain management, even though some SSCM definitions exhibit significant overlap with GSCM definitions. Generally, all definitions of GSCM find that the integration of environmental thinking into the supply chain management practices is the main area of concern, however, the definitions of SSCM employ a broader triple bottom line approach (Ahi and Searcy, 2013). Along with enhancing environmental performance, GSCM may also help businesses achieve their profit and market share goals (Mardani et al., 2020). Although the idea of GSCM has been around

since the 1990s, it took many industries until 2000 or even later to adopt the idea of green purchasing due to the existence of numerous obstacles (Wang and Gupta, 2011). Between 1960 and 1970, environmental consciousness began to draw attention, but it had little to do with the supply chain component of business(Mardani et al., 2020). Companies began to worry about their supply chain for material resources between 1970 and 1980 in order to comply with the rigorous environmental restrictions that were in place at the time(Mardani et al., 2020). Then, between 1980 and 2010, businesses began to recognize the value of green technology, leading to the birth of several concepts in green SCM, including waste management, green manufacturing, and green operations. Between 1990 and 2000, businesses started to become accustomed to these ideas. However, because these ideas were viewed as a single action for enhancing the supply chain, they did not have an impact on the broader supply chain's ability to reduce environmental issues (Mardani et al., 2020). Due to stricter environmental requirements and a more complicated supply chain in 2010, most businesses were forced to green their whole corporate supply chain. The growing number of issues, particularly the increased pressure from environmental laws, are addressed in large part by the trends of a green supply chain (Mardani et al., 2020).

GSCM has progressively evolved into a new idea for the sustainable development of businesses (Mardani et al., 2020). According to Paulraj, Chen and Blome (2017), the drivers of business involvement into a SSCM and adoption of sustainable practices are relational and moral motivations. The three basic and fundamental aspects of sustainable development are social, environmental, and economic (Mardani et al., 2020). The environmental dimension includes a number of sub-dimensions, including ecological footprint, emission trading, environmentally sound practices, pollution control, green customer attitude, environmental strategy, and green supplier management (Mardani et al., 2020). Moreover, there are many sub-dimensions within the social dimension, including social impacts and measurement, standards and codes of behavior, social development, health and safety procedures, product safety, community activities, and workplace safety and labor health (Mardani et al., 2020).

Given their perspective of SSCM as an extension of GSCM, Ahi and Searcy (2013) have asserted that a definition of GSCM would be like the definition of SSCM, but would not include the integration of economic and social issues. Overall, the results show that the definitions for GSCM were generally more narrowly focused than those for SSCM and had an overwhelming emphasis on environmental issues. Though some definitions of SSCM show

considerable overlap with definitions of GSCM, it is clear that SSCM is essentially an extension of GSCM. While the integration of environmental thinking into SCM practices is found to be the central point of concern in almost all the definitions of GSCM, the definitions of SSCM adopt a broader triple bottom line perspective. Clarifying the meaning and use of GSCM and SSCM has really been a major emphasis of the literature on these topics. For example, Srivastava (2007, p.54) recommended that GSCM involves "Integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life." Similarly, Ahi and Searcy (2013, p.339) offered the following definition of SSCM: "The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term".

2.6 Sustainable agrifood supply chain management

As per Seuring and Müller (2008) SSCM (SSCM) can be defined as ''the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements''. As illustrated by Brandenburg, Gruchmann and Oelze (2019), SSCM research has gained acceptance by academia and industry in the past 15 years. Because the awareness regarding sustainability is increasing and it is important to make sure that supply chain operations are ''meeting the needs of the current generation without compromising the ability of the future generation to meet their own needs''(WCED, 1987a; Chen and Kitsis, 2017). To be sustainable, a balance must be struck between economic growth, environmental conservation, and social conditions (Allaoui et al., 2018). As per Ageron, Gunasekaran and Spalanzani (2012) and Seuring and Müller (2008), the way organizational innovations and policies in supply chain management are considered in the context of sustainable development are referred to as a sustainable supply chain.

It is critical to address sustainability in the agrifood supply chain since it has significant environmental and social consequences (Allaoui et al., 2018). Agriculture and food consumption are two of the most major causes of environmental challenges such as habitat change, climate change, water use, and toxic emissions, according to the United Nations Environment Program's International Resource Panel in 2010 (Allaoui et al., 2018). The agrifoods supply chain, like any other, is a network of several sectors cooperating in various processes and activities to deliver products and services to the market and meet client requests. However, the relevance of indicators such as food quality, safety, weather-related fluctuation, and limited shelf life of products distinguishes the agrifood supply chain from other supply chains(Van Der Vorst, 2005). The agrifood supply chain is increasingly complex and difficult to manage as a result of these indicators (Allaoui et al., 2018). Agrifood supply chains, which have traditionally consisted of autonomous and independent players, are increasingly becoming globally integrated systems with intricate linkages, affecting how food is produced, processed, and supplied to market (Burch and Lawrence, 2005; Naik and Suresh, 2018).

Concerns about ensuring an economically and environmentally sustainable food supply have grown as global demand and production have increased. Agriculture has evolved into a series of agribusinesses characterized by high levels of productivity in globalized markets and supply chains as a result of the development of the human population and the increase in the need for food. Furthermore, strong demand and increasing agricultural intensity have resulted in a series of adjustments in the production chain, with the goal of increasing the pace of production processes (Zanin et al., 2020). This resulted in land resource strain and had an influence not just on agriculture only, but also on the society and the environment (Kariuki et al., 2019; Zanin et al., 2020). Agricultural and horticultural products are often produced and distributed by agrifood supply chains to end users or consumers (Ahumada and Villalobos, 2009). Agrifood supply chains frequently face major and complicated obstacles in attaining long-term sustainability, which include economic, environmental, and social factors. For example, the food industry's contributions to waste generation and greenhouse gas (GHG) emissions are consistent with consumer growth patterns in both developed and developing countries (Li et al., 2014). In the agrifood business, particularly in developing countries, social issues such as health and safety, salaries, gender equality, and a lack of social protection are all regarded as serious difficulties (Nemarumane and Mbohwa, 2013). Furthermore, public

awareness regarding the importance of having nutritious and environmentally friendly food products is growing, providing incentives for most agrifood companies to focus on enhancing the sustainability of their supply chains (Matopoulos et al., 2007; Dania, Xing and Amer, 2018). In the mid-1960s, reflections and discussions led to the development of sustainability. These mobilizations required the quantitative and qualitative maintenance of environmental resource stocks, as well as their usage without jeopardizing their sources or reducing their future supply ability, in order to meet both current and future needs (Sehnem and Oliveira, 2017). Elkington (2011) developed the phrase Triple Bottom Line (TBL) in the business world, which refers to analyzing a company's financial, social, and environmental performance over time. Managers need to consider the whole cost of conducting business in this manner. As a result, companies must quantify the value they create or destroy at the economic, social, and environmental levels from a TBL perspective (Sehnem and Oliveira, 2017). Organizations must incorporate sustainability policies and guidelines from the strategic to the operational level to become sustainable, providing assistance to society and going against traditional management, which is typically geared toward the interests of partners and based solely on economic development (Sehnem and Oliveira, 2017). It is critical to understand that no organization can exist without financial resources. When it comes to sustainability, however, this perspective extrapolates from an economic perspective, involving concern for citizens' quality of life, environmental development, the community in which the organization is embedded, encompassing culture, politics, human and ecological capital, and respect for the principles of equity and democracy (Sehnem and Oliveira, 2017).

Sustainability leads to a bottom-up strategy for resource savings, a strategy to reach out to a new consumer base, and a strategy to win, maintain, and enhance the status of employees, customers, and their community when properly planned and implemented (Sehnem and Oliveira, 2017). It consists of four elements: a) social (act with consideration for others); b) economic (profit); c) environment (protect and restore the ecology); and d) cultural (reserve and cherish cultural variety). The participation of small farmers and other producers in these demanding sourcing networks, as well as institutional measures that assist them fulfil the severe food safety and quality rules, are major concerns on the sustainable development agenda (Naik and Suresh, 2018).

The fundamental rationale for implementing sustainable practices is that organizations that successfully handle environmental and social concerns can generate more business prospects

than their competitors (Li et al., 2014). This is also consistent with the findings of other research on green supply chain management (Zhu and Sarkis, 2004; Rao and Holt, 2005; Li et al., 2014).

2.7 Dimensions of sustainable agrifood supply chain management

Figure 2.4: Triple bottom line (TBL) framework
Source: Carter and Rogers (2008)

2.7.1 Environmental sustainability

The environmental sustainability studies in agrifood supply chain can be divided into three categories: carbon footprints (Miranda-Ackerman, Azzaro-Pantel and Aguilar-Lasserre, 2017), food waste (Irani and Sharif, 2016; Sgarbossa and Russo, 2017), and food quality and security due to extended supply chains (Derqui, Fayos and Fernandez, 2016; Irani and Sharif, 2016; Sun, Wang and Zhang, 2017). An agrifood supply chain requires its members to be proactive in adopting methods that enhance waste resource recovery (Sgarbossa and Russo, 2017).

The environmental pillar focuses on eco-efficiency, which is defined as the provision of goods and services at competitive prices, satisfying human needs and ensuring life quality, while also attempting to gradually reduce the ecological impacts and intensity of resource consumption, taking into account the product's entire life cycle (Elkington, 1998). It also refers to activities that prevent environmental damage, such as lowering pollution levels and protecting biodiversity, as well as substituting renewable resources for non-renewable ones. Environmental sustainability can be achieved by preserving or recovering the planet's resource capacity, implementing socially just and economically viable technological developments, imposing restrictions on fossil fuel consumption, reducing waste and

pollution, and reducing and optimizing consumption by developed countries (Elkington, 1998).

2.7.2 Social sustainability

The social pillar is concerned with achieving a more equitable income distribution that promotes social participation, a good life, and widespread access to social resources and services. The consolidation of processes that promote fairness in the distribution of products and income to considerably improve the rights and conditions of the majority of the population, minimizing disparities in living standards, is referred to as social sustainability. The social pillar emphasizes social well-being, with the goal of reducing social disparities through empowering, for example, women and minorities (Elkington, 1998). The key focus of studies dealing with social sustainability was determined to be the development of reduced supply chains as a competitive and survival strategy for small farms. The short supply chain encourages farmers to participate actively in the supply chain, as well as community and youth development. Initiatives like the development of open markets and regional food hubs have been found to improve farmers' communication skills and interpersonal relationships (Berti and Mulligan, 2016; Chiffoleau, Millet-Amrani and Canard, 2016; Giampietri et al., 2016). Few studies have found that alternative supply chains, such as wholesale produce auctions with competitive bidding (Johnson, Fraser and Hawkins, 2016), organic community supported farming (Doernberg et al., 2016), and focusing on local products (Schmitt et al., 2017), give farmers greater chances. Small farmers must be included in the supply chain, and a strong institutional framework must be in place for an agrifood supply chain to achieve its social sustainability goals of higher productivity, rural development, and land conservation (Jelsma et al., 2017).

2.7.3 Economic sustainability

Economic sustainability studies are focused on lowering overall supply chain costs and addressing specific methods to reduce transportation and supply chain design expenses (Musavi and Bozorgi-Amiri, 2017). Many of these studies have social and environmental impact as secondary objectives, such as reducing overall carbon emissions, reducing water footprint, and creating jobs (Accorsi et al., 2016; Allaoui et al., 2018). Short supply chains and buying local food items are indicated as the sustainable method giving ecological, health, and socio-economic benefits, like the measures proposed for socially and ecologically sustainable agrifood supply chain (Ilbery and Maye, 2005; Schmitt et al., 2017). Some strategies are

identified as effective for developing economically sustainable agrifood supply chains by some researchers such as combined action strategies with robust institutional arrangement by the farmers (Jelsma et al., 2017), alternative packaging (Battini et al., 2016), partially guaranteed prices (Tang, Sodhi and Formentini, 2016), and revenue sharing contracts between the buyers and farmers (Yan et al., 2015). The financial results of a company are fundamentally reflected in the economic pillar (Elkington, 1998). Physical, financial, human, and intellectual capital must all be considered in the short and long term for comprehending the economic pillar, but additional notions such as social and ecological capital can also be considered (Elkington, 1998). Economic sustainability allows for the appropriate use and management of production resources, as well as the flow of public and private investments. As a result, from an economic standpoint, economic sustainability also includes the effective allocation and distribution of natural resources (Zanin et al., 2020).

2.8 Core functions of SSCM

Figure 2.5 shows the core functions of SSCM, which includes sustainable procurement, sustainable production, sustainable distribution, and sustainable logistics. A brief description of the core functions is given below.

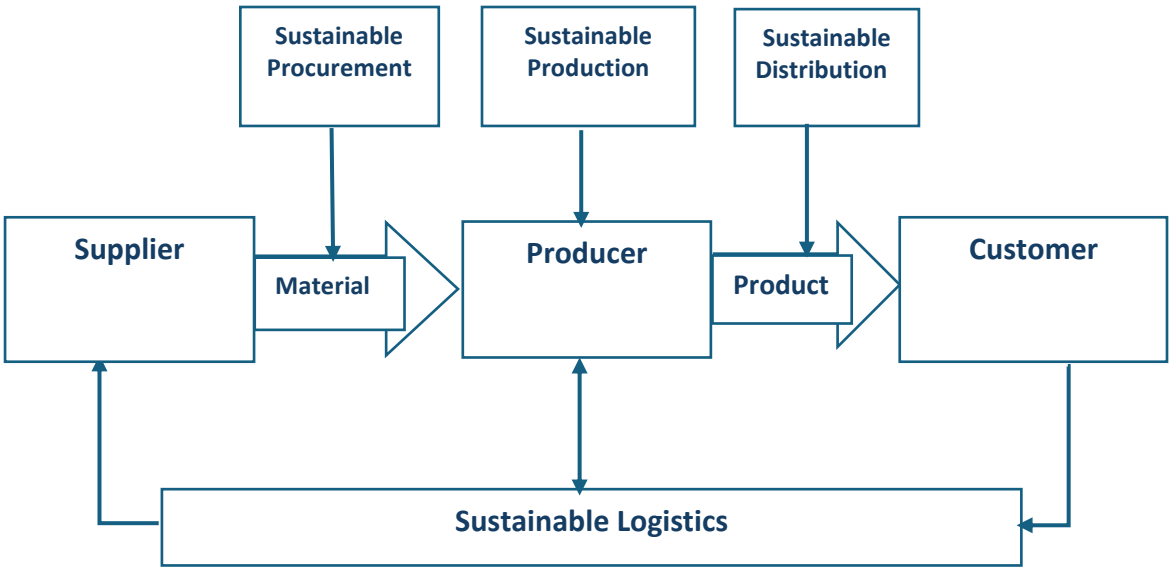


Figure 2.5: The core functions of SSCM

2.8.1 Sustainable procurement

The rise of corporate responsibility and environmental initiatives among businesses has fueled the concept of sustainable procurement (Young, Nagpal and Adams, 2016). Generally, in its most basic form, sustainable procurement can be described as both the environment

and society responsible purchasing (Walker and Phillips, 2009; Brammer and Walker, 2011). Sustainable procurement is defined as a process by which organizations meet their needs for goods, works, and utilities in a way that maximizes value for money over the course of their entire life by providing benefits for the organization, society, and the economy while minimizing harm to the environment (DEFRA, 2006). To be considered sustainable, purchasing practices often assess the supply chain and its consequences in light of five factors: safety, philanthropy, diversity, and the environment (Brammer and Walker, 2011).

Sustainable procurement addresses waste reduction via the elimination of hazardous waste as well as material substitution through the appropriate sourcing of raw materials (Min and Galle, 2001). Participation of suppliers is essential to enhancing businesses' environmental performance since suppliers are capable to guarantee that materials acquired are environmentally sustainable and were manufactured using eco-friendly practices (Hsu et al., 2013). Therefore, the production of ecologically sustainable goods or services necessitates close collaboration with suppliers (Carter and Carter, 1998). With the help of such collaborative advantages, businesses can develop ecologically friendly goods and services by leveraging on the resources and green industry knowledge they need (Esfahbodi, Zhang and Watson, 2016).

According Shekarian et al. (2022), sustainable procurement practices demand that purchasing process be green and sustainable. The first green practice entails making sure that products are with a green logo, recyclable and made from environmentally friendly raw materials, such as certified organic coffee, hormone- and antibiotic-free meat, eco-friendly and lighter packaging, and shopping bags (Zailani et al., 2012; Moretto et al., 2018; Duque-Uribe, Sarache and Gutiérrez, 2019). The second is related to socially responsible purchasing practices, such as taking into account the impact of bought products on human rights, for example, not buying items made by employees under inadequate or substandard working conditions (Prasad et al., 2018; Baliga, Raut and Kamble, 2020). The third and the most crucial recommended practice is to craft a supplier selection strategy based on an acceptable code of conduct (Ciccullo et al., 2020; Warasthe et al., 2020). This approach increases purchasing transparency and strengthens local producers and procurement centers (Mejías, Paz and Pardo, 2016; Narimissa, Kangarani-Farahani and Molla-Alizadeh-Zavardehi, 2020). Implementing sustainable procurement practices facilitates the purchase of environmentally friendly inputs, which eliminates related wastes and emissions (Carter, 2005). The elimination

or reduction of waste is expected to result in lower costs and better economic performance (Esfahbodi, Zhang and Watson, 2016). Therefore, in order to have an impact on all facets of the supply chain, including suppliers, employees, and customers; organizations need to embrace socially, and environmentally responsible purchasing practices also called sustainable procurement (Carter and Jennings, 2004).

2.8.2 Sustainable production

Sustainable production can be described as a production process employing inputs that have a minimal negative impact on the environment and produce little to no waste or pollution (Lakshmimeera and Palanisamy, 2013). Sustainable design is the most important sub-attribute of sustainable production that can be assessed and measured (Zhu, Sarkis and Lai, 2007). As per Zhu et al. (2008) and Green et al. (2012), sustainable design reflects the green activities included in manufacturing processes, which serves to basically depict the sustainable production method.

Moreover, sustainable design attempts to enhance environmental performance of business while reducing negative environmental effects (de Sousa Jabbour, de Oliveira Frascareli and Jabbour, 2015).Sustainable design can be categorized as the design of products and processes (Shekarian et al., 2022). The first aspect of sustainable design consists of procedures for creating goods that lower consumer health risks, are simple to disassemble, contain green materials and less dangerous compounds, are eco-friendly, and require less energy to operate (Marshall et al., 2015; Ahmad et al., 2016; Lu, Lai and Chiang, 2016; Wang and Dai, 2018; Yusuf et al., 2020), for example, products that can be transported in smaller spaces and can be stored at room temperature (Qorri, Gashi and Kraslawski, 2021). The second area is concerned with the steps taken to produce goods and services and can be characterized as actions taken to lessen waste, emissions, and energy use, such as the use of time-based competition, just in time, total quality management tools, and sustainable packaging (Das, 2018b; Vargas, Mantilla and de Sousa Jabbour, 2018). The goal of the sustainable design practice is to eliminate waste and ensure environmental sustainability across the supply chain (Zhu et al., 2008). This type of waste minimization can enhance cost performance by lowering expenses connected with waste disposal or treatment as well as improving the environment (Green et al., 2012).

Sustainable production methods employ technologies for cleaner production and process modernization, resulting in less energy consumption and contamination (Raut, Narkhede and

Gardas, 2017; Das, 2018b; Li, Fang and Song, 2019). For example, adopting intelligent factory components, manufacturing machinery renewal, and cutting-edge technology for water-saving and remanufacturing (Shekarian et al., 2022). Several approaches are developed in various industries, such as the textile sector, which uses biological production, organic cotton, substitution of water-based alternatives to solvent-based polyurethane and natural dyeing processes (Islam, Perry and Gill, 2021), and in the food industry through returnable and sustainable packaging (Shekarian et al., 2022). Other techniques, such as digitalization, mass customization, lean philosophy, computer-aided design and manufacturing, mobile and remote maintenance, RFID technology, 3D seamless technology, additive manufacturing, and digital printing, can be used to transition toward sustainable production (Choudhary et al., 2020; Yadav et al., 2020; Islam, Perry and Gill, 2021; Qorri, Gashi and Kraslawski, 2021).

2.8.3 Sustainable distribution

Sustainable distribution addresses environmental concerns relating to sustainable transportation, storage, inventory management, warehousing, packaging, and facility location selection decisions with the objective at producing the least amount of adverse environmental impact, such as the smallest carbon footprint (Sarkis, 2006). Green package attributes including size, shape, and materials are crucial in sustainable distribution because they have an impact on product transportation (Seuring and Müller, 2008). Moreover, the logistics network design is crucial in the context of SSCM and offers alternatives such as direct shipment or hub-and-spoke, central warehouse or distributed network, intermodal or single mode, and third-party services or private fleet (Lakshmimeera and Palanisamy, 2013). Potentially, businesses can take advantage of good packaging combined with repositioned loading patterns since they can utilize less materials, make greater use of warehouse space, and require less handling (Esfahbodi, Zhang and Watson, 2016).

A key component of sustainable distribution is the reduction of emissions related to the transportation of goods along the supply chain, which is developed to improve environmental performance (Green et al., 2012). According to Hollos, Blome and Foerstl (2012), there is a considerable direct correlation between sustainable distribution and cost and environmental performance. Moreover, they also stated that while the advantages of green logistics and packaging can be realized in long-term profitability, short-term implementation is expensive due to the need for technological advancements.

Transportation is a crucial component of logistics systems; therefore, sustainable distribution strives to reduce the environmental impact when transporting raw materials and finished goods along the chain (Shekarian et al., 2022). Hence, it should be used to generate economies of scale in both inbound and outgoing transportation (Mitra and Datta, 2014; Das, 2017; Das, 2018a).

According to Shekarian et al. (2022), the suggested green transport practices can be divided into six categories: first, consolidation and collaboration actions, such as multi-drop, multi-pack, and cross-docking by the integration of demand; consolidation of internal and external site systems; coordination of lot sizes and collaborative warehousing; cooperation with vendors to reduce packaging size (Golini et al., 2017; Duque-Uribe, Sarache and Gutiérrez, 2019; Qorri, Gashi and Kraslawski, 2021); second, the use of renewable and alternative energy sources (Esfahbodi et al., 2017); third, the modernization, reorganization, and automation of freight logistics networks, such as weight and volume reduction, full-load truck utilization, environmentally friendly storage practices, container weight reduction, enhanced refrigeration, and reduced human intervention (Islam, Perry and Gill, 2021); fourth, tracking emissions generated during product distribution (Esfahbodi, Zhang and Watson, 2016); fifth, the development of services to reduce or even stop travel and sixth, the discovery of shorter routes for product transportation to minimize the pertinent costs and emissions (Golini et al., 2017).

2.8.4 Sustainable logistics

According to Zhu, Sarkis and Lai (2008), the process of recovering and recapturing the value in reverse logistics is not only achieved through the efficient reuse and recycling of unwanted or end-of-life products but may also be done so by selling surplus goods and assets. Reverse logistics is sometimes referred to as being the reverse of forward logistics and is defined as a process were used or end-of-life products are transferred from the place of consumption for potential recycling and remanufacturing reasons (Lai, Wu and Wong, 2013). To obtain the economic value of returned goods in the supply chain, product and material recovery is a crucial end-of-life practice that is frequently highlighted in the literature (Gopal and Thakkar, 2016; Wang, Zhang and Goh, 2018; Zimon, Tyan and Sroufe, 2020). It can be done by applying strategies for green, reverse, and closed-loop SC logistics, such as refurbishing, repairing, reusing, and remanufacturing (Mathivathanan, Kannan and Haq, 2018). Reverse logistics encompasses a variety of various activities such as container recycling, energy-efficient

transportation, recyclable pallet systems, green investment, the elimination of excess packaging materials and shipping, working with third parties for product recovery and combining production and recovery (Ahmad et al., 2016; Vargas, Mantilla and de Sousa Jabbour, 2018). This calls for working together with partner businesses that are skilled in collecting unwanted goods and getting them ready for recycling processes (Esfahbodi, Zhang and Watson, 2016). Investment recovery is a practice that focuses on recovering and recapturing the value of idle or end-of-life assets through efficient reuse or excess sales, which has the potential to improve environmental performance (Green et al., 2012). Reusing and selling surplus resources helps with investment recovery, which eventually reduces waste and emissions from by-products (Zhu, Sarkis and Lai, 2008). Due to the surplus sales of old and scrap materials as well as capital excess equipment, investment recovery might have an effect on a company's cost performance (Zhu, Sarkis and Lai, 2008). In addition, Zhu, Sarkis and Lai (2007) showed a relationship between performance outcomes and investment recovery and claimed that investment recovery could affect both environmental and economic performance.

The supply chain process releases various wastes in solid, liquid, and gas form from beginning to end, for example, through CO2 emissions that increase the company's carbon footprint. (Shekarian et al., 2022). Therefore, to reduce pollution, businesses should work to prevent, regulate, or minimize waste (Kusi-Sarpong, Sarkis and Wang, 2016).The likelihood of contamination can be decreased by adhering to specific protocols, such as hazard analysis and important control points in the food sector (Jia, Diabat and Mathiyazhagan, 2015; Golini et al., 2017; Wu, Santoso and Roan, 2017; Jaegler and Goessling, 2020). It is suggested to take a variety of approaches, including managing waste by-products and establishing a recycling system for waste products, using waste as a resource, requesting suppliers to commit to waste reduction goals, proper segregation, using alternatives to incineration, and finally landfilling (Shekarian et al., 2022).

2.9 Overview of the Ethiopian coffee industry

2.9.1 History and background of Ethiopian coffee industry

Ethiopia is the largest producer of Arabica coffee in Africa and the historical origin of Arabica coffee. Ethiopia has a broader assortment than any other coffee-producing country, with 24 approved kinds of the Arabica coffee that varies in taste, size, color, and quality (UNIDO, 2015;

Garo, Shara and Mare, 2016). Furthermore, the country is known for producing high-quality coffee, which might help to improve sales (UNIDO, 2015). Majority of the Ethiopian coffee is organic, since most coffee farmers do not use agrochemicals on their soil (Tefera and Tefera, 2014; Minten et al., 2019). This boosts Ethiopian coffee's desirability and competitive advantage in the international market, particularly in specialty coffee (Tefera and Tefera, 2014; UNIDO, 2015). Ethiopia is the biggest exporter of organic coffee from Africa (Minten et al., 2015b). The coffee SC in Ethiopia includes the typical stages such as input supply, production, primary marketing, primary processing, trading, green coffee exporting, and secondary processing (Beshah, Kitaw and Dejene, 2013).

Smallholder coffee growers or commercial farms, primary collectors, suppliers, processors, cooperatives, exporters, and other governmental entities are some of the stakeholders involved in the coffee supply chain (Beshah, Kitaw and Dejene, 2013). The actors engaged in the coffee can be direct or supporting actors. Farmers, processors, cooperatives, the Ethiopian Commodity Exchange, exporters, distributors, and retailers are some of the direct actors who directly add value to coffee production. Whereas the supporting actors provide support in the value creation of the product, and can be governmental institutions, associations, research institutions, and NGOs (Gashaw, Habteyesus and Nedjo, 2018).

2.9.2 Production and export statistics of Ethiopian coffee

Ethiopia is the largest producer of coffee in Africa and the fifth in the world, next to Brazil, Vietnam, Colombia, and Indonesia, contributing about 4.45% of the global coffee production of 2019/20 harvesting year (International Coffee Organization, 2020). The coffee industry in Ethiopia dominates the agriculture sector in its contribution to the national economy in general and exports in particular (Berhe, 2010). Coffee in Ethiopia accounts for 4 to 5% of GDP, 10% of total agriculture production, 40% of total exports, 10% of total government revenue, and 25 to 30% of total export earnings (Adem, 2019). Coffee export of the country has generated 1.4 billion USD in the 2021/22 fiscal year (National Bank of Ethiopia, 2022). More than 25% of the working population of Ethiopia are directly or indirectly involved in the production, processing, trading of coffee (Feleke, 2018). Even though it needs further investigation to identify the real causes, the productivity of the coffee farming in Ethiopian is almost stagnant and low as compared to other coffee producing countries. From the year 2015/16 to 2020/21 the average coffee productivity was 0.64 tons per hectare (Central Statistical Agency, 2016; 2018; 2019; 2020; 2021). This is consistently lower than that of other

coffee-producing countries, such as Brazil (0.78 t/ha), Vietnam (1.31 t/ha) and Colombia (0.76 t/ha) (Ayele, Worku and Bekele, 2021). However, the production of coffee and the farming area coverage in the past six years (2015/16 to 2020/21) has increased on average by 40% and 30% respectively. Besides, as can be seen from figure 2.6, in the harvesting year of 2023/24 Ethiopia has produced 8.35 million 60 kg bags of coffee which accounts 6% of total production of coffee in the word (USDA, 2024). As a result, Ethiopia is ranked the fourth producer of coffee in the world next to Brazil, Vietnam, and Colombia in the production year 2023/24.

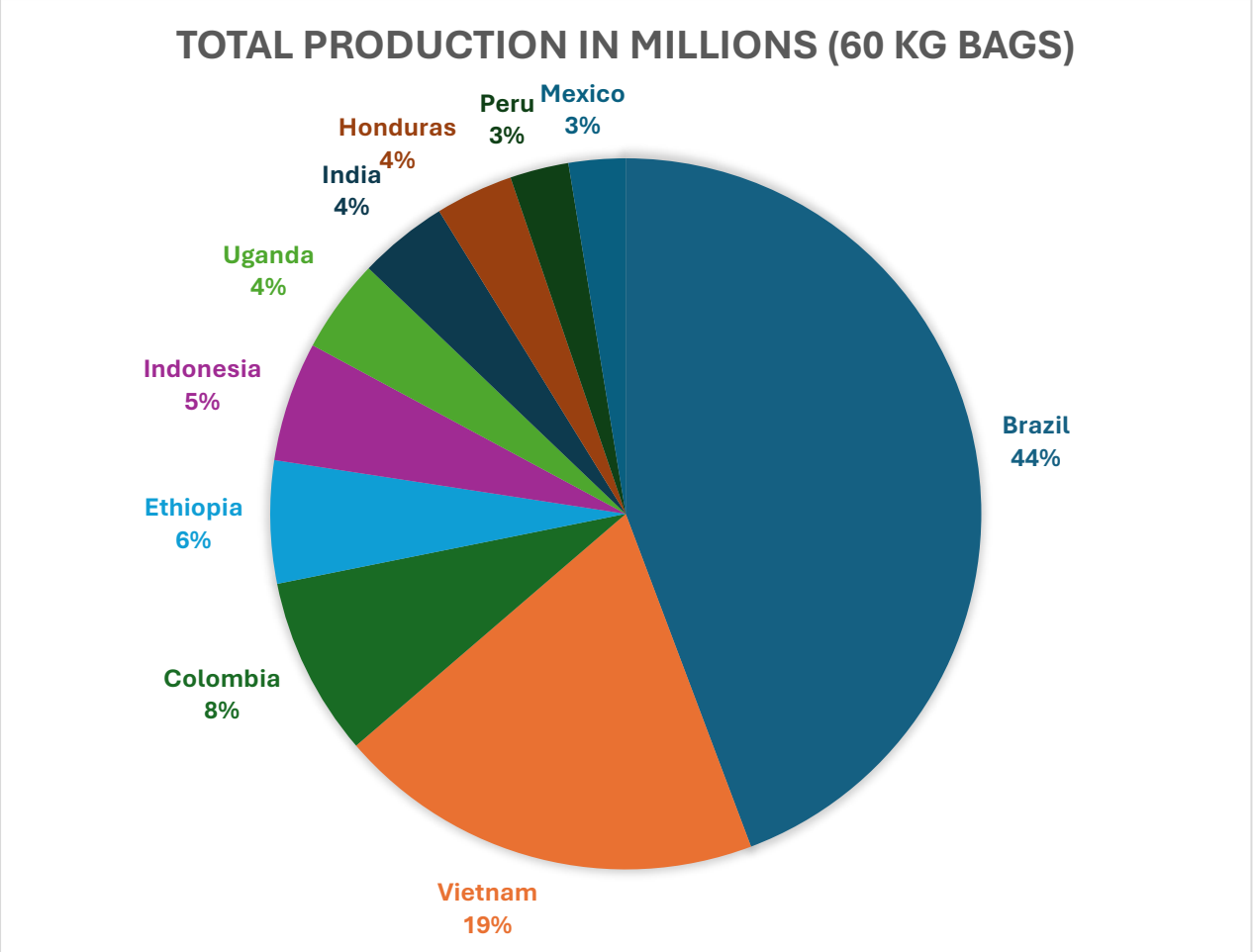


Figure 2.6: Production of coffee by countries

2.9.3 Importance and challenges of Ethiopian coffee industry

The Ethiopian coffee industry is a backbone of the country's economy in terms of employment creation and hard currency generation. To enhance the sector and benefit more it is important to understand the challenges along the coffee SC. The main challenges of the Ethiopian coffee industry are low productivity and marketing problems. The Ethiopian coffee farming has low productivity as compared to the top three world coffee-producing countries.

The productivity is found to be much lower than that of Vietnamese, Brazilian, and Colombian coffee production (Ayele, Worku and Bekele, 2021). In addition, like other agribusinesses in developing countries, the issue of sustainability is a challenge. The environmental and social sustainability status of the Ethiopian coffee supply chain in is unknown. The other challenge of the Ethiopian coffee, which is also common to other coffee producing and exporting countries, is related marketing problem. The marketing of Ethiopian coffee through the Ethiopian Commodity Exchange makes it a simple commodity, reducing the traceability neither in quality nor in grower origin (Handino et al., 2019). According to Daviron and Ponte (2005), to improve the value of coffee in the global market, they proposed to treat and brand coffee as the sum of attributes produced by different actors along the value chain rather than as commodity beans.

2.10 Ethiopian coffee supply chain

2.10.1 Definition and characteristics of Ethiopian coffee supply chain

Coffee in Ethiopia is a source of foreign exchange and employment opportunity significantly. Considering the importance of the commodity to the national economy, the Ethiopian government has planned to increase the production and productivity of coffee significantly within (2016 to 2020) five years (National Plan Commission, 2016) , as a result the production has increased notably (Tefera, 2022). In addition, the coffee market is expanding and the global demand for coffee has risen by more than 60% since the 1990s (International Coffee Organization, 2020), which resulted in the increase in production and exports (Utrilla-Catalan et al., 2022).

Ethiopia's coffee production has grown by more than 35 percent from the year 2011 to 2020 since the coffee seedlings planted 5 to 10 years ago have stated to produce now (Tefera, 2022). The coffee export volume in the year 2019/20 is 298,726 tons, in 2020/21 amounts to 273,373 tons and in 2021/22 it has increased to 334,000 tons (National Bank of Ethiopia, 2022). The coffee export has generated 855.9 million USD (2019/20) and 1.43 billion USD (2021/22). The export earnings from coffee have increased by 57.3 percent in 2021/22 due to the 29.0 percent growth in international price and 22.0 percent in export volume as compared to the performance in the year 2020/21 (National Bank of Ethiopia, 2022). However, the ambitious move the government of Ethiopia to boost the productivity and production of coffee only focuses on the economic benefits and disregards the environmental

and social perspectives. It is mainly concerned with increasing the economic paybacks for the actors in the coffee supply chain and foreign exchange for the country.

2.10.2 Structure and actors in Ethiopian coffee supply chain

The main stages of the Ethiopian coffee supply chain include production, harvesting, primary processing, storage, handling and transport, grading and trading, secondary processing, export, domestic consumption.

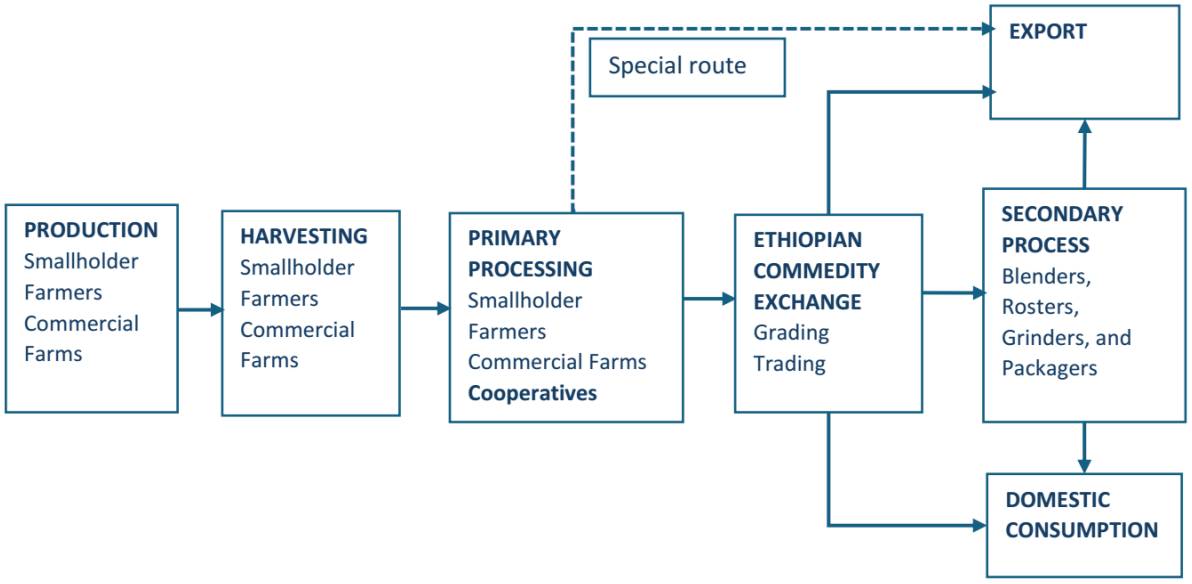


Figure 2.7: Structure of the Ethiopian Supply Chain

Production: According to Minten et al. (2019), Ethiopia's coffee producing population is projected to be over 4 million people. Smallholder farmers produce around 95% of total production, whereas commercial farms accounting only for 5% (Tefera and Tefera, 2014; Mitiku, Nyssen and Maertens, 2017; Minten et al., 2019). Farmers are often involved in the production stage of the coffee supply chain, as well as harvesting and primary processing (Gashaw, Habteyesus and Nedjo, 2018). In Ethiopia, there are four main coffee producing systems: forest, semi-forest, garden, and plantation coffee (Chauhan, Hooda and Tanga, 2015; Garo, Shara and Mare, 2016; Minten et al., 2019).

Harvesting: Coffee is harvested once a year in most coffee-producing countries. Harvesting season varies from year to year, although it usually takes place between November and February. During the harvesting season, farmers usually need additional labor, which can be limited at this time. This may lead to the usage of child labor, as children can help farmers by selecting coffee cherries, reducing their workload (Galdo, Dammert and Abebaw, 2018). There are two methods of harvesting coffee, selective harvesting and non-selective

harvesting or strip harvesting (Etana and Aga, 2019; Minten et al., 2019). Both the selective- and non-selective methods can be performed by hand or using machines (Poltronieri and Rossi, 2016).

Primary Processing: After the coffee cherries are harvested, they go through the first stage of processing known as primary processing. Cooperatives, farmers, and other private actors can do this (Gashaw, Habteyesus and Nedjo, 2018). The outer layers of the coffee cherry are removed during primary processing, leaving the coffee bean wrapped in a silver skin and parchment layer, known as green coffee. There are many post-harvest processes that can be used; however, the most common ones are wet and dry processing (Minten et al., 2019). The two processes have their own distinct effects on the taste and aroma of the processed coffee (dos Santos Scholz, Prudencio and Kitzberger, 2019).

Storage, Handling and Transport: Coffee undergoes storage, handling, and transport, within each stage and through out of the supply chain. As a result, a variety of actors, including farmers, collectors, and cooperatives, can be involved in these operations (Gashaw, Habteyesus and Nedjo, 2018). Storage, handling, and transportation activities across the supply chain have a significant impact on coffee quality (Etana and Aga, 2019). This is due to the fact that coffee is a hygroscopic good, which means it absorbs foreign elements and moisture from its surroundings and can readily get polluted, changing its flavors (Garo, Shara and Mare, 2016).

Grading and Trading: The grading and trading of the Ethiopian coffee is undertaken mainly by Ethiopian Commodity Exchange (ECX). ECX is a significant actor in the Ethiopian coffee supply chain. The ECX was founded in 2008 with the aim of building a modern marketplace that connects Ethiopian buyers and sellers of important commodities. There was no established market for quality assurance in the country prior to its establishment. Coffee, sesame, haricot beans, maize, and wheat are the most common commodities traded on the ECX (Tefera and Tefera, 2014). ECX is established to ensure the quality and traceability of the traded commodities including coffee, to avoid exploitation of farmers and inequality between actors, and to reduce price volatility and incentivize farmers.

Secondary Processing: Ethiopia is a major coffee exporter, and the country frequently sells green beans to large multinational corporations who want to undertake their own secondary processing. Only around 1% of Ethiopia's total coffee production is thought to be subjected to secondary processing within the country (UNIDO, 2015). All parts of secondary processing

must be in place before the final consumer can brew and drink the coffee. It entails a number of steps, including coffee blending, roasting, grinding, and packaging for retail and commercial use (UNIDO, 2015).

Coffee Export: Ethiopia mostly exports green coffee, which is neither roasted nor decaffeinated. Ethiopian coffee is in high demand in the international markets due to the famous Arabica coffee variety that originated in the country (Minten et al., 2019). This boosts Ethiopian coffee's desirability and competitive advantage in the worldwide market, particularly in specialty coffee (Tefera and Tefera, 2014; UNIDO, 2015).

Domestic Consumption: Coffee consumption has a long tradition in Ethiopia, as it is an important element of social life and has cultural significance (Chauhan, Hooda and Tanga, 2015). It is estimated that around half of the coffee production in the country is consumed in Ethiopian households, which makes the country one of the largest consumers of the beverage coffee (Mitiku, Nyssen and Maertens, 2017; Minten et al., 2019).

Cooperatives: Cooperatives are actors that participate and play a significant role in and between several stages of the supply chain (Gashaw, Habteyesus and Nedjo, 2018). According to Nugusse, Van Huylenbroeck and Buysse (2013), cooperatives can be defined as "an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations". There is an increasing share of smallholder farmers organized in cooperatives in Ethiopia, as the number of cooperatives has increased (Minten et al., 2015b). Cooperatives can improve farmers' practices by sharing insights on modern agricultural methods and new technologies (Chambo, 2009; Shumeta and D'Haese, 2018). The Ethiopian coffee has a lower level of producer traceability when it passes through the Ethiopian Commodity Exchange (ECX). Therefore, cooperatives through their unions can bypass the more commoditized ECX to export their certified organic coffee to the international market through the special route (Handino et al., 2019).

2.10.3 Value distribution and power dynamics in Ethiopian coffee SC

The coffee value chain is very complicated, with numerous production phases and a significant number of stakeholders, from farmers to consumers, who participate in the process (Marescotti and Belletti, 2016). It is a multi-billion-dollar worldwide industry with thousands of enterprises and millions of farmers, the majority of whom are smallholders (Daviron and Ponte, 2005; Samper and Quiñones-Ruiz, 2017). Based on studies conducted on the global value chain and its vertical integration, among the social problems identified is

found to be the "win-lose" relationship, in which big business always wins, and small producers always lose (Oya, 2012). As a result, the margin for the downstream segment of the global value chain has increased. As per Voora et al. (2019), around 70% of the world's coffee production was exported in 2017 earning USD 19 billion, while the coffee retail sector brought in USD 83 billion. For example, in 2018, Ethiopian farmers were selling a kilogram of coffee beans for USD 0.29 while the average price of regular cup of coffee cappuccino in the U.S. in early 2019 was around USD 4.0 (Kshetri, 2021). The global coffee supply chain is characterized by the existence of power imbalance and coffee paradox (Daviron and Ponte, 2005). The governance is in the hands of actors based in developed countries which resulted in power imbalance and situated the coffee producers in a weak position. According to Daviron and Ponte (2005), this situation is described as 'Coffee Paradox'. Coffee paradox is a predicament in which the price for farmers is plummeting and unstable on the one hand while consumer prices are increasing on the other. The global coffee market has changed from being dominated by producers in the upstream segment to a market dictated by buyers (Rueda and Lambin, 2013).

2.10.4 Success stories and best practices in Ethiopian coffee SC

Based on the literature analysis the following success stories and best practices in the Ethiopian coffee SC are identified. First, around 95% of the coffee produced in Ethiopia is organic through organically managed production process (Tefera and Tefera, 2014; Minten et al., 2015b). Second, the government is supporting the Ethiopian coffee supply chain through the provision of extension services to adopt improved technologies in production, harvest, and post-harvest practices (Bachewe, Koru and Taffesse, 2015). Third, the government is introducing market policy reform to empower coffee producers, improve quality and reduce transaction costs for farmers (Minten, Assefa and Hirvonen, 2017). For example, the Ethiopian government has amended the proclamation numbers 287/2002, 602/2008 and 1051/2017 cited as 'coffee quality control and marketing proclamation' (Addisie and Tebarek, 2022). These proclamations give a special permission to organic coffee producers through their associations to export directly to foreign markets bypassing the Ethiopian commodity exchange.

2.10.5 Sustainability challenges of Ethiopian coffee SC

The productivity of the Ethiopian coffee is low and stagnant as compared to the major coffee producing countries. However, the production of coffee in Ethiopia in the past six years has

increased at least by 40% (Central Statistics Services of Ethiopia, 2021). This indicates the increase in production of coffee is achieved mainly by expanding the farming land which may have an impact upon the environment. Chanyalew (2019), has pointed out that the Ethiopian coffee is facing a serious threat mainly due to deforestation and climate change. Moreover, it is confirmed that under a business-as-usual scenario, by 2050, average warming in coffee producing regions will see temperatures increase by 1.3°C and it is projected that 75% of suitable land for Arabica coffee production and 63% of land for Robusta coffee production will be lost (Sachs et al., 2019). This environmental sustainability challenge may have a consequence on the livelihood of all the people directly or indirectly involved in the Ethiopian coffee supply chain. Therefore, it is crucial for the coffee supply chain to address the environmental and social sustainability concerns.

2.11 Research themes of the study

This section intends to present a general overview of the themes of the research phenomenon and depicts the discussion of relevant theoretical discourse which can support the study in addressing the research questions and objectives. To accomplish this aim, an overlapping literature approach is applied to combine all the three main research questions together, which helps the study in realizing the research questions and achieve the main research objectives of conceptualizing the SSCM critical factors-practices-outcomes framework. The primary step in addressing the first research question is to explore the critical factors that determine the adoption of SSCM initiatives in agrifood supply chains. Hence, the researcher has examined the impact of the critical factors in the adoption of SSCM practices and thereby on the outcomes of implementation of sustainability initiatives. The first research theme deals with the critical factors which is a set of drivers, enablers, and barriers that determine the adoption of SSCM initiatives. Subsequently, relevant literature concerning the drivers, enablers, and barriers that determine the adoption of SSCM in agrifood supply chains is reviewed and analyzed. The next step deals with answering the second research question of the study by identifying the crucial SSCM practices required to successfully implement sustainability initiatives. Thus, the researcher has explored the essential SSCM practices to examine their impact on the outcomes of sustainability initiatives implementation. The researcher has developed the second research theme of SSCM practices which encompasses the key sustainability practices. The last step in addressing the research questions of the study

is concerned with the performance outcomes of implementation of SSCM practices. To examine the end results of SSCM implementation in terms of performance outcomes, the researcher ought to explore the relevant performance indicators from the agrifood supply chain perspectives. Accordingly, the researcher has formed the third research theme of outcomes of sustainability initiatives adoption. To identify the outcomes of the adoption of SSCM, the researcher has reviewed relevant literature concerned with the performance outcomes of sustainability initiatives implementation. Generally, to address the research questions and accomplish the objectives of the research, the study has employed a systematic literature review approach to develop the three-research theme. The three themes of the study are critical factors, sustainability practices, and performance outcomes of SSCM.

2.11.1 Critical factors to adopt SSCM

It is important to understand the critical factors that determine the implementation of sustainability initiatives. As per Mastos and Gotzamani (2022), the term critical factors encompass enablers, drivers, and barriers, and can be described as a set of factors that enable or inhibit the successful implementation of SSCM initiatives. Besides, it is crucial to differentiate the terms drivers and enablers, which are often used synonymously. Similar to Lee and Klassen (2008) and Danese, Lion and Vinelli (2019), this study define drivers as the factors that initiate and encourage business organizations to adopt SSCM. Whereas the term enabler is used to describe the factors that assist an organization in successfully implementing sustainable business initiatives.

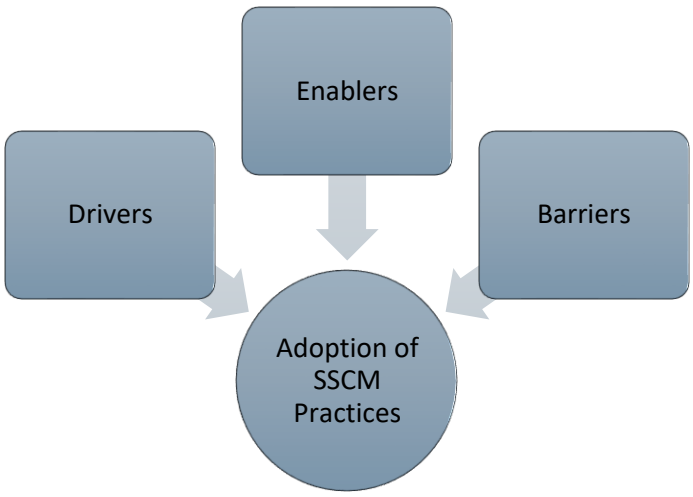


Figure 2.8: Conceptual model on the critical factors

2.11.1.1 Drivers of SSCM

In this study, the study defines drivers in line with Lee and Klassen (2008) as the forces or motivating factors influencing a commercial organization's adoption of SSCM. According to Chkanikova and Mont (2015) drivers can be categorized into four classes: regulatory, resource, market, and social. The regulatory factor encompasses drivers such as pressure from government; the resource factor drivers are related to the reduction of operational costs and enhanced profit, improving brand image and reputation; and the market factor comprises drivers such as demand for sustainable and healthier food, opportunity to increase sales, gain competitive advantage by entering sustainable markets, and meet industry norms. In addition, social factors include drivers such as pressure by consumers, active NGOs movement exerted by the media, and avoidance of accountability. According to Golini et al. (2017), the drivers of sustainable initiatives in agrifood supply chains can be classified into three categories. The first category is internal drivers, which include factors such as reduction in operating costs, enhancement of the value of the company, and employee welfare. The second class comprises external drivers that comply with current and future regulations, address customer and retailer pressure, enhance brand image and corporate reputation, stakeholder pressure, and establish better relations with the local community. The third category, known as contingent drivers, consists of factors, such as company size and being part of a multinational group. Ouro-Salim and Guarnieri (2023) also identified the drivers of sustainability in food supply chains and classified them into three categories: coercive, normative, and mimetic. Coercive pressure refers to stringent government regulations to initiate sustainability schemes. Normative pressure can trigger sustainability initiatives with consumer awareness and attitudes playing a crucial role. Mimetic drivers encourage companies to imitate the best sustainable practices of successful organizations. Mehmood et al. (2021) also analyzed the drivers of sustainability in agrifood supply chains and classified them into six groups. The first is the policy and economy group, which includes drivers such as laws to promote leaner production, natural resource conservation, health, and safety. The second is financial drivers, which encompass financial and economic benefits as causes of sustainability initiatives. Environmental protection is the third group, which includes ecological conservation, the quality of agriculture, and the protection of renewable resources. Fourth, the health benefits group included paybacks related to animal and human health. The fifth social benefits category includes social benefits such as quality of life and job creation.

Finally, the product development and innovative solutions group refers to innovative ideas for recycled products that increase their value. Additionally Zimon, Tyan and Sroufe (2020) identified the drivers of implementing sustainable supply chain initiatives in the agrifood sector. The drivers are classified into three categories: internal drivers related to the company, suppliers, and customers; and SSCM third parties.

Nguyen et al. (2023) stated that drivers such as management, top management sensitivity and commitment, regulatory pressure, market pressure, and competitive pressure are the main drivers of sustainable supply chains. Adams, Donovan and Topple (2023) classified drivers into two categories: internal and external. Employee attraction and retention to reduce costs and increase payback and the application of advanced technologies are identified as internal drivers. External drivers include pressure from customers and consumers, government and legal frameworks, pressure from non-governmental organizations, competitive advantage, supply chain collaboration, and fostering company reputation. Govindan (2018) discusses the drivers of sustainability initiatives from the perspective of stakeholders in the agrifood supply chain. The stakeholders regarded in determining the drivers are the government, business, consumers, nongovernment organizations, development cooperation agencies, media, and research centers. In addition, Emamisaleh and Rahmani (2017) elucidated these drivers and classified them into two broad categories, internal and external, from the perspective of the food industry in Iran. Internal drivers are identified within the internal environment of the organization, and include managerial attitudes, top management support, and employee motivation. External drivers emanate from entities that exist in the external environment of the organization, such as competitors, suppliers, distributors, consumers, and the government, and classify them as mimetic pressure, normative pressure, and coercive pressure. Besides, Kashyap and Shukla (2024) have also categorized the drivers under social, economic and environmental factors. Table 2.1 presents the main drivers that prompt organizations to initiate a sustainable supply chain.

Table 2.1: Drivers of SSCM initiatives

Type of Driver	Description	Reference
Regulations (environmental, regional, international)	Certification requirements, government pressure, regional or international regulators, and trade associations can be triggers to encompass sustainability.	(Chkanikova and Mont, 2015; Shibin et al., 2016; Emamisaleh and Rahmani, 2017; Golini et al., 2017; Dania, Xing and Amer, 2018; Govindan, 2018; Jia et al., 2018; Saeed and Kersten, 2019; Luthra et al., 2020; Zimon, Tyan and Sroufe, 2020; Mehmood et al., 2021; Mohseni, Baghizadeh and Pahl, 2022; Adams, Donovan and Topple, 2023; Nguyen et al., 2023; Ouro-Salim and Guarnieri, 2023; Kashyap and Shukla, 2024)
Social well-being and social responsibility	Social wellbeing campaigns, pressure from consumers organizations, media and public pressure are some of the societal pressures to commence sustainable initiatives.	
Economic and productivity improvement	To enhance operational or economic performance, to address cost-related pressures, to implement organization strategy, and top management commitment.	
Reputation and brand image enhancement	As a means of building brand image and gaining customer confidence.	
Adoption of innovative business model	To deal with socio-cultural responsibility, innovativeness, code of business conduct, health and safety.	
Competitive advantage	To enhance operational or economic performance, to address cost-related pressures, to implement organization strategy, and top management commitment.	
Inclusion of sustainable processes	An organization's willingness to change and improve the existing sustainability practices.	
Supportive organizational culture	It includes information dissemination, innovativeness, health and safety issues, and the organization's code of conduct.	
Access to technology and infrastructure	New technology and equipment are important factors in process innovation	
Government policies and legislation	Government agencies are responsible for developing regulations related to labor relations, employment conditions, and environmental management.	
Supply chain collaboration	Strong cooperation among the members of the supply chain can drive an organization to embrace sustainability.	

Source: Authors' own work

2.11.1.2 Enablers of SSCM

The term enablers is meant to describe the factors that assist organizations or supply chains in successfully implementing sustainable business initiatives. Hence, in this study enablers can be recognized as the success variables and factors that contribute to the success of the adoption of sustainability (Mangla et al., 2018). According to Hidayati, Garnevska and Childerhouse (2023), enablers to implement SSCM initiatives in the agrifood supply chain can be categorized into seven groups. The first is related to the attitudes or behaviors of individual actors and can motivate the implementation of sustainable practices. The second group comprises information and communication enablers, and the regular exchange of information and communication encourages actors within the supply chain to improve sustainable practices and capture more value. The third group of enablers is institutionally related; the institution can help actors in a supply chain to collectively take actions, such as proceeding with contractual arrangements. The fourth class of enablers is related to the role of the government, and the regulation and intervention of the government provide the essential ability to successfully practice sustainability. The fifth category includes facilitation in various forms, including training and incentives, which help actors accelerate the implementation of sustainable practices. The sixth class comprises market-related enablers, and access to sustainable markets encourages the implementation of sustainability practices in agrifood supply chains and provides a better opportunity. The final group of enablers is related to certifications for determining the standard practices and compliance. Furthermore, Mangla et al. (2018) identified and analyzed enablers to successfully implement sustainability in agrifood supply chains in an Indian context. They have identified enablers such as incentives and support of various agencies, understanding customer and stakeholder requirements, understanding the importance and benefits of sustainability initiatives, management involvement, support and commitment, resource allocation and information sharing within and across the hierarchy, joint planning and capacity building for delivering sustainable products, monitoring and auditing ongoing supply chain activities, and cost-effectiveness and improvements in overall performance. Mastos and Gotzamani (2022) illustrated enablers and classified them into firm, supply chain, and external levels. Firm-level enablers refer to the internal factors that firms should consider for the successful implementation of sustainability initiatives. Top management commitment, customer demand, knowledge and expertise, training, and efficiency are among the most common firm-level enablers. Some of the most

common supply chain-level enablers include information sharing, trust, supply chain strategy, and the geographical distance between supply chain partners. External enablers include government policies, international or national regulations, stakeholders, competitors, and investors. Elhidaoui and Kota (2023) identified enablers as pathways and classified them into three groups: social, operational, and organizational. Social enablers include the employment of competent human resources, continuous training, and incentive mechanisms to raise awareness of the benefits of sustainability initiatives. Operational enablers include the adoption of green waste management strategies, energy consumption reduction, pollution prevention, and application of cleaner technologies and techniques. On the other hand, improving the relationship among all stakeholders, such as customers, suppliers, and distributors; ensuring compliance with environmental regulations through internal audits; and certification with sustainability standards are regarded as organizational enablers. The main enablers for the successful implementation of sustainability initiatives are presented in Table 2.2.

Table 2.2: Enablers to adopt SSCM initiatives

Enablers	**Description**	**References**
Incentives and support of various agencies	Expectation of getting support from various sources in terms of money, technology and infrastructure is important for implementing sustainability.	(Akhtar et al., 2016; Mangla et al., 2018; Mani and Gunasekaran, 2018; Luthra et al., 2020; Mastos and Gotzamani, 2022; Elhidaoui and Kota, 2023; Hidayati, Garnevska and Childerhouse, 2023)
Understanding customer and stakeholder requirements	Consumer demand and supply chain partners' interest in sustainable agricultural products is significant.	
Understanding the importance and benefits of the sustainability initiative	Understanding the importance of sustainable initiatives in agricultural products and their benefits in the long run are crucial from the sustainability adoption	
Management involvement, support, and commitment	Top management involvement, support and commitment can be very crucial initiatives to incorporate sustainability.	
Resources allocation and information sharing within and across the hierarchy	Sharing of the required key resources and information on the sustainability efforts among supply chain partners are significant in sustainability adoption.	

Joint efforts, planning and capacity building	Joint effort of supply chain members, building the capacity of partners and developing the existing capacity in terms of plant capacity, technology inclusion is significant in sustainability adoption.	
Monitoring and auditing the ongoing supply chain activities	Monitoring and auditing ongoing supply chain activities are important to drive sustainability.	
Cost effectiveness and improvements in overall performance	Sustainable initiatives may enable the progress of agricultural products towards cost effectiveness, and hence enhanced performance.	

Source: Authors' own work

2.11.1.3 Barriers of SSCM

Organizations in agrifood supply chains typically encounter numerous obstacles and challenges (Gupta et al., 2020). Barriers, also called challenges, are setbacks or obstacles to the implementation of sustainable agrifood supply chain management initiatives. According to Chkanikova and Mont (2015), barriers can be classified into regulatory, resource, market, and social factors. The regulatory barriers include lack of government leadership and support, and resource factors include setbacks, such as high initial investment costs, lack of financial resources, and lack of a sufficient degree of expertise. The barriers related to market factors include globalization, the complexity of the agrifood supply chain, and high production and operating costs. Social factors cover barriers such as insufficient consumer interest for sustainable products and rejection of the impact of unsustainable production by society. Naseer et al. (2019) divided barriers into two categories, production and marketing. Production barriers include factors related to production input, while marketing constraints are related to the marketing of output. In addition, Ouro-Salim and Guarnieri (2023) proposed four categories of barriers to implementing sustainability initiatives in agrifood supply chains, the first category is related to financial constraints, such as a lack of sufficient financing to cover the high initial. The second is concerned with infrastructure limitations, such as lack of appropriate design and optimization and lack of reverse logistics for recycling. The third group is related to technological innovations such as a lack of appropriate innovation and technology. Fourth, there is resistance from consumers and actors, such as a lack of corporation and consumer awareness. In addition, Mehmood et al. (2021) identified barriers to sustainability initiatives in agrifood supply chains and grouped them into six

categories. These barriers are financial and economic, public policy and institutional, logistical and infrastructural, operational, knowledge and skill, and technological. Agyemang et al. (2018) identified and classified barriers into operational barriers related to the focal enterprise, operational barriers related to supply chain internal actors, and strategic barriers related to external actors in the supply chain. The operational barriers related to focal enterprises include a lack of top-level management commitment, high financial costs, difficulties in assessing environmental sustainability performance, and lack of integrated management information and traceability systems. Poor multi-tier suppliers' commitment, unwillingness to exchange information among supply chain members, lack of sustainability-oriented suppliers, low consumer demand for sustainable products, low customer awareness of sustainable products, and uncertainty of economic benefits are classified as operational barriers to supply chain internal actors. The strategic barriers related to external actors in the supply chain include inefficiency or a lack of national and regional policies and regulations, as well as inadequate support and guidance from NGOs and development agencies.

Ghadge et al. (2021) categorized the challenges in implementing sustainability initiatives in agrifood supply chains into two categories, internal and external barriers. Internal barriers include misinterpretation of sustainability by top management, lack of top management inertia to derive sustainability initiatives, focus on short-term strategic goals, high initial investment costs, shortage of firms' capabilities and resources, smaller firm size, unorganized return management, and management and operational complexity. The external category includes barriers, such as the unwillingness of parties within the supply chain to exchange information, shortage of supplier capabilities and resources, lack of appropriate environmental regulations and legislation, insufficient support and guidance from regulatory authorities, fragmented and traditional market structure, lack of sustainability awareness among customers, poor logistics infrastructure, and insufficient demand for sustainable products.

Similarly, Adams, Donovan and Topple (2023) pointed out barriers to sustainability initiatives and classified them into two broad categories: internal and external. Resistant to cultural change, high implementation costs, and the absence of suitable technological solutions are internal barriers. Lack of sustainability policy and legal framework and lack of resources to effectively monitor their distant suppliers are considered external barriers. Furthermore, Govindan (2018) identified barriers from the perspectives of stakeholders in implementing

sustainability, such as government, business, consumers, nongovernment organizations, development cooperation agencies, media, and research centers. In addition, Mastos and Gotzamani (2022) illustrated the barriers and classified them as firm, supply chain, or external. The absence of factors, such as top management commitment, customer demand, knowledge and expertise, training, and efficiency, are firm-level barriers. Lack of information sharing, trust, supply chain strategy, and geographical distance between supply chain partners are regarded as supply chain-level barriers. The lack of government policy, international or national regulations, and absence of pressure from stakeholders, competitors, and investors are identified as external barriers. Elhidaoui and Kota (2023) pointed out that the barriers to sustainable practices are high costs, lack of knowledge, insufficient support from stakeholders, and lack of regulation. High cost of acquiring advanced technology, building reverse logistics, and implementing sustainability standards. Lack of knowledge of sustainability practices and benefits is another barrier. Moreover, stakeholders' failure to play their role, such as a lack of cooperation from suppliers and poor customer awareness, are challenges in implementing sustainability initiatives. The lack of regulations in sustainable supply chain perspectives and failure to comply with existing regulations are other setbacks. Besides, Sahu et al. (2023) have explored the challenges that obstruct the implementation of sustainability initiatives in agrifood supply chains. Hence, lack of understanding about the requirements of customers and other stakeholders, lack of transparency and trust, lack of auditing and monitoring of the ongoing supply chain activities, and lack of competitive advantages are identified as crucial barriers. Based on a literature analysis, the identified barriers are stated in Table 2.3.

Table 2.3: Barriers to adopt SSCM initiatives

Barriers	**Description**	**Reference**
Communication gaps and inadequate collaboration between parties	No or little collaboration and communication around the chain, information distortion causing inappropriate resource utilization.	(Chkanikova and Mont, 2015; Agyemang et al., 2018; Govindan, 2018; Naseer et al., 2019; Olatunji et al., 2019; Gupta, Kusi-Sarpong and Rezaei, 2020; Nazam et al., 2020; Ghadge et al., 2021; Mehmood et al., 2021; Mastos and Gotzamani, 2022; Mohseni, Baghizadeh
Unclear sustainability principles and measures	Lack of sustainable supply chain performance measurement and standardized performance measures.	
Poor awareness and understanding	Lack of awareness and understanding among organizations about the benefits of implementing sustainable	

	innovations, small and medium scale enterprises are more likely to suffer from unawareness.	and Pahl, 2022; Adams, Donovan and Topple, 2023; Elhidaoui and Kota, 2023; Ouro-Salim and Guarnieri, 2023; Sahu et al., 2023; Singh et al., 2023)
High financial costs and lack of resources	A considerable amount of investment is required to apply technologies and sustainable practices.	
Lack of skilled and professional or workforce	Lack of expert supply chain professionals to ensure strategic collaboration and a good domain of sustainability programs, lack of motivated employees, lack of qualified staff and training programs.	
Lack of top and middle management support	Lack of interest by the top and middle-level management, which can reduce the organization's capacity to implement sustainability initiatives effectively.	
High complexity of operational processes	Difficulty to integrate sustainability initiatives into the day-to-day operational and administrative activities.	
Difficulty in mindset and cultural changes	Resistance to change and embrace sustainability initiatives among employees in supplier's facilities.	
Complex legal and regulatory requirements	Stringent legal and administrative requirements	
Sustainability risks or uncertainty	Uncertainties about the achievements and outcomes of sustainability initiatives.	
Lack of government support	It includes the lack of financial support and weak institutions and poor law enforcement.	
Lack of proper technology and infrastructure	Unavailability of latest technologies and systems that can prevent interference in the institutionalization of green supply chain strategies.	

Source: Authors' own work

2.11.2 SSCM practices

As per Li et al. (2005), supply chain management practices are defined as the set of actions carried out in an organization to undertake effective management of its supply chain. Besides, SSCM practices are defined as sustainability activities undertaken by an organization in

cooperation with its stakeholders to promote effective management of sustainable supply chain (Mastos and Gotzamani, 2022). According to Dyer and Singh (1998) firms may engage in the adoption of SSCM practices in order to be seen as a socially legitimate establishment. As per Ajmal et al. (2018), organizations practicing social sustainability is expected to make them reputable, respectful, and less vulnerable to risk. Moreover, organizational theories tried to explain why firm in involve in the implementation of sustainability initiatives, for example, institutional theory which asserts pressures external to the focal company influence its actions and the stakeholder theory states that diverse stakeholders pressurize companies to minimize the negative externalities impacts of their business operations (Touboulic and Walker, 2015; Paulraj, Chen and Blome, 2017).

2.11.2.1 Environmental sustainability practices

Rao and Holt (2005), have reported the practices of green supply chains encapsulating in eight variables. These are environmentally friendly raw materials; substitution of environmentally questionable materials; taking environmental criteria into consideration; environmental design considerations; optimization of processes to reduce solid waste and emissions; use of cleaner technology processes to make savings in energy, water, and waste; internal recycling of materials within the production phase; and incorporating environmental total quality management principles such as worker empowerment. Besides, Vachon and Klassen (2008) have identified multiple environmentally responsible activities from perspectives suppliers and customers. Achieving environmental goals collectively; developing a mutual understanding of responsibilities regarding environmental performance; working together to reduce the environmental impact of operational activities; conducting joint planning to anticipate and resolve environmental related problems; making joint decisions about ways to reduce the overall environmental impact of our products are related with suppliers. Moreover, achieving environmental goals collectively; developing a mutual understanding of responsibilities regarding environmental performance; working together to reduce the environmental impact of our activities; conducting joint planning to anticipate and resolve environmental-related problems; and making joint decisions about ways to reduce the environmental impact of the company's product are activities associated with customers. The adoption of the environmental management standard system, such as ISO 14001 certification can be a means to implement environmental sustainability (Hoejmose and Adrien-Kirby, 2012). Moreover, Hanim et al. (2012) identified use of recycled raw materials, life cycle

assessment, products with recyclable contents, materials and energy conscious products, packages with recyclable contents, reusable packages, minimize packaging materials as strategies to implement environmental sustainability. García-Arca, Prado-Prado and Garrido (2014), have asserted that an environmentally sustainable packaging should facilitate reuse, recycling and/or recovery packaging materials, i.e. reverse logistics. According to Mitra and Datta (2014) environmental sustainability practices encompass sustainable product and process design, packaging, storage, transportation and distribution of raw materials and finished goods, and recovery and/or disposal of products and packaging discarded or returned after use through reverse supply chains and sustainable purchasing. Mitra and Datta (2014) have affirmed educating and generating awareness of suppliers, helping suppliers set up environmentally friendly practices, putting pressure on and incentivizing suppliers to exercise EMS/ISO 14001, urging suppliers to supply environmentally friendly materials, and supplier audit and selection based on environment-related criteria as practices to implement environmentally sustainable purchasing. In addition, Baliga, Raut and Kamble (2019) confirmed environmental practices in supply chain management include sustainable product design, sustainable process design, waste minimization, packaging improvement, environmentally responsible purchasing, green and reverse logistics, customer sustainability information, environmental certification. Dai, Xie and Chu (2021), elucidated environmental protection management, sustainable packaging, and product eco-design as environmental responsibility management practices. Table 2.4 summarizes the environmental sustainability practices.

Table 2.4: Environmental sustainability practices

Environmental Practices	**Description**	**Reference**
Sustainable process design	Evaluation and redesign of our existing processes to reduce their impact on the environment.	(Rao, 2004; Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019)
Waste minimization	Optimization and redesign of processes for the reduction of waste.	(Rao, 2004; Rao and Holt, 2005; Baliga, Raut and Kamble, 2019)
Packaging improvement	Evaluation of packaging materials to ensure that they are beneficial, safe and health for individuals and communities.	(Rao and Holt, 2005; Hanim et al., 2012; Zailani et al., 2012; García-Arca, Prado-Prado and Garrido, 2014; Baliga, Raut and Kamble, 2019)

Green and reverse logistics	Usage of environmentally friendly modes of transportation and reverse logistics processes in place for the organization's waste products.	(Rao and Holt, 2005) (Vachon and Klassen, 2006; Zailani et al., 2012; García-Arca, Prado-Prado and Garrido, 2014; Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019)
Environmentally responsible purchasing	Guiding suppliers to establish environmental improvement programs and cleaner production technologies.	(Mitra and Datta, 2014) (Rao, 2004; Vachon and Klassen, 2006; Zailani et al., 2012; Baliga, Raut and Kamble, 2019)
Environmental certification	Implementation of Environmental management systems like ISO 14000 to reduce our environmental impact.	(Hoejmose and Adrien-Kirby, 2012; Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019)
Customer sustainability information	Providing information to customers on environmentally friendly products and cooperation with customers for cleaner production.	(Rao and Holt, 2005) (Vachon and Klassen, 2006; Lu, Lee and Cheng, 2012; Baliga, Raut and Kamble, 2019)

Source: author's own work

2.11.2.3 Social sustainability practices

Longo, Mura and Bonoli (2005), explored socially responsible practices from stakeholders' perspective of employees, suppliers, customers, and community. The identified practices include health and safety at work, development of workers' skills, wellbeing and satisfaction of the worker and quality of work, social equity, partnership between ordering company and suppliers, selection and analysis systems of suppliers, product quality, safety of customer during use of product, consumer protection, transparency of consumer information on product, creation of added value for the community, and environmental safety and protection. Furthermore, Awaysheh and Klassen (2010) revealed that human rights, labor practices, codes of conduct, and social audits are supplier socially responsible practices. Similarly, Lu, Lee and Cheng (2012), have elucidated the social sustainability activities from investors, employees, customers, suppliers and community point of view. Provide investors with full and accurate financial information about the organization; offer employees with salaries that properly and fairly reward them for their work, ensure the health and safety of our employees, care about the private and professional lives of employees, and support employees who want to pursue further education; adapt products or services to enhance the

level of customer satisfaction, provide all customers with the information needed, and satisfy the complaints of our customers about products or services; incorporate the interests of our suppliers in our business decisions and pay attention to how suppliers manage the ethical performance of their upstream partners; and financially support education and cultural activities of the communities, help improve the quality of life, and stimulate the economic development of the community where the business operates. According to García-Arca, Prado-Prado and Garrido (2014), socially sustainable packaging should facilitate recycling, provide honest, clear and true information, adapt product use to the needs of specific customers such as elderly or people with disabilities, or guaranteeing safety in product consumption. Moreover, (Shafiq et al., 2014) have described social sustainability practices from the perspectives of employees, suppliers, customers, and community by applying stakeholder theory as lens. Hence, they have identified maintaining safe working conditions and the well-being of employees; ensure that suppliers treat their employees fairly, have acceptable social behavior, and monitoring social expectations compliance of suppliers; design efforts to prevent harm or misuse during product use, improving customer knowledge about a product to ensure safe use of product, and improving product traceability throughout its useful life; improving relationships with the local community, through the use of various communication mediums, involvement of employees in philanthropic activities within the community, and compliance with regulations as social sustainability practices. Besides, Mani et al. (2016), have explained supply chain social sustainability in developing countries from supplier, manufacturer, and customer dimensions. Hiring locals, women, handicapped, marginalized, minorities, promoting every employee equally based on merit, ensuring safety at workplace, ensuring health and hygiene, avoiding sub-standard materials in manufacturing, usage of non-hazardous materials, prohibition of child and bonded labors, paying reasonable wages to employees, helping to develop local suppliers, philanthropic activities, and supplier compliance to local regulations are presented as dimensions of supplier social sustainability. Buying from women owned minority enterprises and local suppliers, extending help to local communities in building schools, colleges and training centers; complying with OHSAS 18000 certification for occupational safety and health; not allowing employees to engage in any unethical practices that include bribing, insider trading pollution, and whistleblower policy; hiring and promoting equity between male and female and ensuring diversity in hiring and promotion; non appointment of sweatshop workers and encouraging human rights and right

to associate with unions; offering donations to education institutions, NGO's, and religious organizations and construction and renovation of schools and colleges and educational institutions; prohibition of child and bonded laborers in manufacturing operations, and providing the salaries that properly and fairly reward them for their work are depicted as a dimensions of manufacturer sustainability. Protection of human rights in channels, prohibition of children and bonded labor in channels, ensuring health care and insurance programs for channel employees, non-usage of hazardous materials in products thereby protecting consumers, gender diversity in hiring and promotions in channel employees, hiring sales and marketing workforce locally, and educating and training the channel employees for skill development are exhibited as dimensions of customer social sustainability. In addition, Baliga, Raut and Kamble (2019) identified human rights, safety and health, equity and ethics, philanthropy and social welfare, employee welfare, socially responsible purchasing, and customer social responsibility as social sustainability practices in supply chain management. Besides, Dai, Xie and Chu (2021) explored human rights, philanthropy, and safety as the social responsibility management practices. Summary of the social sustainability practices is presented in Table 2.5.

Table 2.5: Social sustainability practices

Social Practices	**Description**	**Reference**
Human rights	Making sure that not to engage in child labor or sweatshop labor at processing and distribution locations.	(Zailani et al., 2012; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)
Safety and health	Adopting an environmental, health and safety policy and organization.	Ahi and Searcy (2015b), (Longo, Mura and Bonoli, 2005; Zailani et al., 2012; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)
Equity and ethics	Ensure policies for gender non-discrimination and payment of wages equal to or higher than average industry wages.	(Longo, Mura and Bonoli, 2005; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)
Philanthropy and social welfare	Construct health, water and school facilities in and around processing facilities.	(Zailani et al., 2012; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)
Employee welfare	Attempting to provide salaries that fairly reward employees for their work	(Rao, 2004; Longo, Mura and Bonoli, 2005; Ahi and Searcy,

	and educating employees for skill development.	2015b; Baliga, Raut and Kamble, 2019)
Socially responsible purchasing	Ensure that the organization has a supplier code of conduct and specific audit procedures to guarantee that our suppliers adhere to our social expectations.	(Vachon and Klassen, 2006; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)

Source: author's own work

2.11.3 Outcomes of sustainability practices

As can be seen from Figure 2.9, the environmental and social sustainability practices have corresponding environmental, social and economic performance outcomes. As per Rao (2004) the results of the environmental initiatives are optimization of process to reduce air emission; taking environmental criteria into consideration; optimization of process to reduce solid waste; substitution of environmentally questionable materials; use of technology to make savings in energy, water and waste; optimization of process to reduce noise; optimization of process to reduce water use; and recycling of material internal to the company. Longo, Mura and Bonoli (2005), explained the end results of socially responsible practices such as an improvement of the company's image, more satisfaction among employees, and a reduction in the company's negative impact on the environment. Furthermore, Hanim et al. (2012) acknowledged overall environmental performance, compliance to environmental standards, reduction in air pollution, reduction in energy consumption, and reduction in material usage and reduction in hazardous materials as the outcomes of environmental sustainability. Mitra and Datta (2014) explained the outcomes of environmental sustainability practices from environmental, economic, and competitive aspects. They confirmed that environmentally sustainable practices have positive relationship with environmental performance. The economic performance outcomes include organizational, financial, and marketing performance measures. Besides, competitiveness outcome covers the operational and competitive dimensions of firm performance and includes quality, productivity, efficiency, innovation, cost savings, sales, market share, penetration of new markets, acquisition of new customers, profitability and growth, and corporate image. Additionally, Ahi and Searcy (2015a) explored indicators to measure outcomes of green and SSCM practices such as reduction of solid wastes, recycling, decrease of consumption for hazardous, harmful or toxic materials, process optimization for waste

reduction, pollution control, pollution prevention, health and safety practices, new market opportunities, market share, profitability, environmental compliance and auditing programs, decrease of frequency for environmental accidents, significant improvement in terms of public relation, and increasing competitiveness.

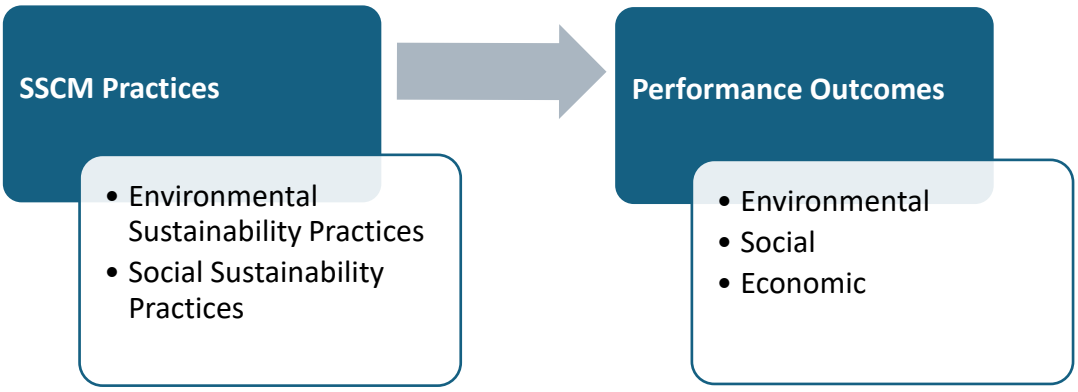


Figure 2.9: Performance outcomes of SSCM practices

As per Ahi and Searcy (2015b), some of the outcomes of social, economic and/or environmental dimensions of sustainability are treat hazardous materials safely, raw material used which poses health, safety or environmental hazard , safe treatment rate of domestic waste, economic welfare and growth, community capital and reduced health and safety costs. Mani et al. (2016), have identified the outcomes of supply chain social sustainability from the dimensions of supplier, manufacturer, and customer. Improved supplier performance, organizational learning, supply chain performance, and increase in stakeholder trust are illustrated as the outcomes of supplier social sustainability. Whereas, improved operational performance, enhanced productivity, and corporate social performance are identified as the result of manufacturer social sustainability. Additionally, corporate image, customer relationship and commitment, and customer performance are described as the end results of customer social sustainability. Besides, Baliga, Raut and Kamble (2019) confirmed that the outcomes of sustainability practices can be measured with environmental performance, social performance, economic performance indicators. Sharifi, Fang and Amin (2023), have identified criteria to measure sustainability performance in agrifood supply chains categorizing in economic, social, and environmental dimensions. Environmental criteria

encompass water usage, land use, energy usage, water contamination, reusability, recycle policy, and wastage. The criteria for social sustainability include food security, safety measures, workers equality, fair trade, workers training, health and social benefits, and social responsibility. Similarly, De Silva, Jayamaha and Garnevska (2023) explained the performance of sustainable farming practices from economic, environmental and social aspects. The economic outcomes are measured in terms of production capacity, projected increase in production, gross income, net income, and profitability of farming. Environmental performance measures include concern on land use, disposal of liquid waste, concern on solid waste, and concern on air pollution. The social sustainability indicators contain quality of life, occupational health, personal socialization, personal housing condition, and personal satisfaction. Besides, Sonar et al. (2024) explored the assessment factors that can provide a comprehensive understanding of the adoption of sustainability initiatives in agrifood supply chain encapsulating in social, economic, and environmental perspectives. The social factors include employment and labor conditions, social equity, community engagement, food security and safety, knowledge and skill development, and social acceptance. Whereas, cost-effectiveness, market competitiveness, value chain efficiency, economic resilience, and income distribution are considered as economic factors. Environmental factors encompass resource efficiency, climate change mitigation, biodiversity conservation, water and soil quality, waste management, adaptation to climate change, and ecosystem services preservation. Table 2.6 depicts the performance outcomes of sustainability practices and the corresponding indicators.

Table 2. 6: Performance outcomes of sustainability practices

Dimension	**Indicators**	**Reference**
Environmental Performance	Reduction in solid and water waste	(Mitra and Datta, 2014) (Rao and Holt, 2005; Hanim et al., 2012; Baliga, Raut and Kamble, 2019)
	Reduction of environmental accidents	(Mitra and Datta, 2014; Ahi and Searcy, 2015b; Baliga, Raut and Kamble, 2019)
	Decrease in consumption of hazardous toxic materials	(Rao, 2004; Hanim et al., 2012; Ahi and Searcy, 2015b; Baliga, Raut and Kamble, 2019)
Social Performance	Improvement of company images	(Hoejmose and Adrien-Kirby, 2012; Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)

	Enhancement of corporate images as an ethical organization	(Shafiq et al., 2014; Mani et al., 2016; Baliga, Raut and Kamble, 2019)
	Improved employee or community health and safety	(Shafiq et al., 2014; Ahi and Searcy, 2015b; Baliga, Raut and Kamble, 2019)
Economic Performance	Increase in sales of coffee	(Rao and Holt, 2005; Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019)
	Reduction in costs of processing and distribution	(Rao and Holt, 2005; Hoejmose and Adrien-Kirby, 2012; Baliga, Raut and Kamble, 2019)
	Increase in organizational profit and profit margins	(Rao and Holt, 2005; Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019)

Source: author's own work

2.12 Chapter summary

In general, this chapter focuses on three major research themes that are essential to building an appropriate framework for this investigation. It started with a theoretical overview of supply chain management (SCM), outlining its primary functions and talking about how it has changed its emphasis to sustainability. The fundamental terms used to describe sustainability were then explained, making a distinction between the GSCM and SSCM ideas. Then, the applied SSCM concept and its essential elements have been thoroughly discussed. Moreover, the research phenomenon is integrated by identifying the primary research themes of the study, critical factors that determine the adoption of SSCM initiatives, implementation of SSCM practices, and SSCM performance outcomes that have been selected. Therefore, in order to synthesize the three research themes and ultimately address the research issues, an overlapping literature strategy has been used. The critical factors that determine the adoption of SSCM which include drivers, enablers, and barriers, have been discussed. Hence, the first theme of the study, which is the critical factors to adopt SSCM, was created; the drivers and enablers that trigger and facilitate the adoption of SSCM have been discussed. Besides, the barriers that obstruct the adoption of SSCM are examined. After that, the second research theme that deals with the SSCM practices was created by synthesizing relevant SSCM literature about the fundamental environmental and social sustainability practices needed for the successful implementation of SSCM initiatives. Lastly, the third research theme has been developed through theoretical discussions on performance outcomes related to the

implementation of SSCM. The theoretical underpinnings of the three dimensions of sustainability have been used to build SSCM performance dimensions and present pertinent SSCM performance measurements. The synthesis of these established research themes enables this thesis to successfully address the research problems and accomplish its main objectives of crafting a comprehensive conceptual framework. In a nutshell, the objective of the literature review chapter was to present the theoretical underpinnings of the integrated research themes of the study.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Overview

Generally, this chapter presents the development of the philosophical and methodological implications of this study and presents the justification of choices applicable to these implications. In this regard, this chapter specifically deals with the transition process from a purely theoretical and conceptual discourse of the study to a suitable practical research application, capitulating responses to the research questions. The chapter is divided into two main parts. The first part covers the study's philosophical and methodological considerations, comprising the research philosophy, research approach, research strategy, research method, research design, data collection technique, and data analysis approach, along with the rationale behind the decisions made. The second part addresses the practical aspects of the methodological issues of the research, including the creation of the questionnaire, data type, ethical considerations, pilot study, sampling strategy, and data collection procedures. In a nutshell, this chapter essentially intends to give comprehensive details about the different steps taken to carry out the practical considerations of this research to maximise replicability and provide a high degree of transparency, thereby showcasing the rigorousness of the research process.

3.2 Research philosophy and approach

Saunders, Lewis and Thornhill (2023) in their research methodology for business students book, have developed and proposed a research onion, depicted in Figure 3.1, which focusses on the primary methodological and philosophical issues that researchers should address to successfully respond to their research questions. All the essential components of a detailed social research project are included in the proposed research onion, especially in the perspectives of management and business field of studies. The philosophical aspects of the study are covered by the outer layers of the research onion, whereas the practical aspects are addressed within the inner layers. Hence, to formulate and justify the philosophical and methodological perspectives of this thesis, this research applied the research onion developed and proposed by Saunders, Lewis and Thornhill (2023). In business management studies, it is a commonly used approach to apply a research onion to help researchers in providing answers to the research questions. Specifically, the two most outer layers of the research onion are concerned with research philosophy whereas the next three layers dela

about the methodological choice, strategy and time horizon of the study. The sixth and the inner layer discuss the detailed procedures and techniques of the research.

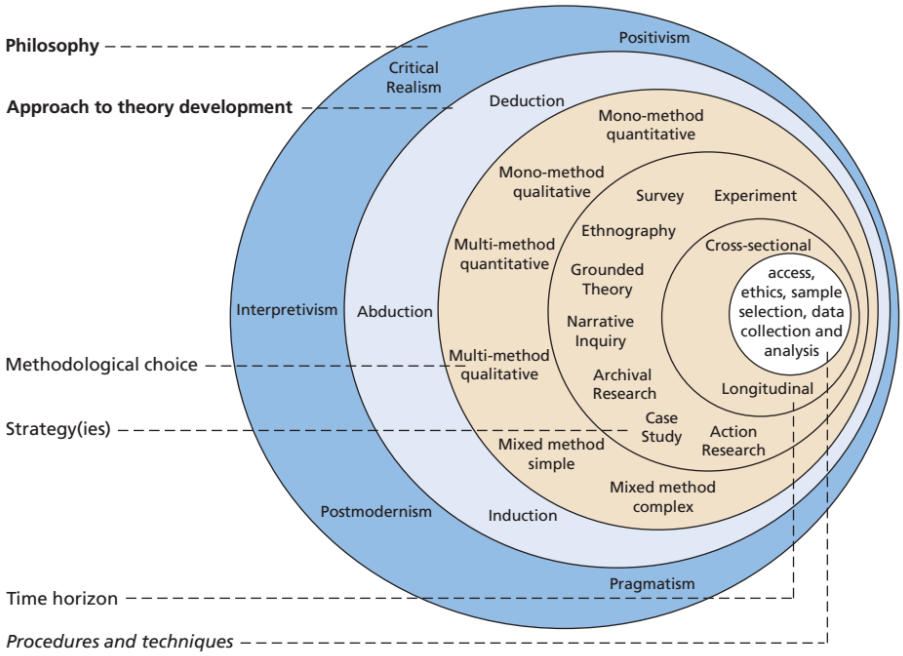


Figure 3.1: The research onion
Source: Saunders, Lewis and Thornhill (2023, p.131)

According Saunders, Lewis and Thornhill (2023), the phrase "research philosophy" describes a set of assumptions and beliefs regarding the development of knowledge and describes the world perspective within which the research is conducted. Research philosophy is often referred as an overarching phrase that is related to the nature of research knowledge and how it develops (Saunders et al., 2009). Hence, a researcher's critical assumptions about how they see the world are part of their research philosophy. Plethora of scholars in research methodology assert that epistemology, ontology, and axiology are the three main approaches to think about the research philosophy in social science (Saunders et al., 2009; Bell, Bryman and Harley, 2022).

Additionally, Bell, Bryman and Harley (2022), support the idea that many research philosophies are derived from epistemological, ontological, and axiological positions under the general umbrella of research paradigms. In a nutshell, a research philosophy typically addresses how data pertaining to the research knowledge should be gathered, examined, and applied (Burrell and Morgan, 2019). As per Saunders, Lewis and Thornhill (2023), the ontological, epistemological and axiological assumptions are described as follows:

Ontology refers to assumptions about the nature of reality. Hence, ontological assumptions shape the way in which the researcher observe and study the research objects. In business and management these objects include organizations, management, individuals' working lives and organizational events and artefacts. Ontology determines how the researcher see the world of business and management and, therefore, the choice of what to research for your research project.

Epistemology pertains to the assumptions about knowledge, what constitutes acceptable, valid and legitimate knowledge, and how we can communicate knowledge to others (Burrell and Morgan, 2019). Although ontology might seem abstract initially, epistemology's significance is clearer. Different forms of knowledge, from facts to tales and stories, from numerical data to textual and visual data, can all be regarded as valid in the multidisciplinary framework of business and management (Saunders, Lewis and Thornhill, 2023). As a result, various business and management scholars use various epistemologies in their work, such as projects based on narratives (Gabriel, Gray and Goregaokar, 2013), films (Griffin, Harding and Learmonth, 2017), and archive research and autobiographical accounts (Martí and Fernández, 2013).

The axiology describes how ethics and morals play an important role in the research process(Saunders, Lewis and Thornhill, 2023). One of the most important axiological decisions that researchers must make is whether they want to view the influence of their personal values and beliefs on the research as a positive thing. Researchers must therefore make decisions about how to handle their own values, as well as those of the people involved in their studies. Heron (1996) contends that human behaviour is driven by our values, hence, researchers will inevitably incorporate their values into their work. Consequently, it is vital that they explicitly acknowledge and consider these when conducting and reporting their research. Both the researcher's values and the methods they choose to use for gathering data are reflected in their research philosophy. Several academics in research methodology (Creswell and Creswell, 2017; Bell, Bryman and Harley, 2022; Saunders, Lewis and Thornhill, 2023) have identified positivism, realism, interpretivism, postmodernism, and pragmatism as the main philosophical stances that are most frequently used in management research. These research philosophies are depicted within the first outer layer of the research onion which indicates research philosophy is considered as the first stage of the research methodology.

These main research philosophies are developed based on the notion of the research paradigms of epistemology, ontology and axiology (Saunders et al., 2009).

Saunders, Lewis and Thornhill (2023) discuss the five major philosophies in business and management, positivism, critical realism, interpretivism, postmodernism, and pragmatism, as follows:

Positivism is related to the philosophical position of the natural scientist and involves with applying an observable social reality to generate law-like generalisations. The term positivism describes the significance of what is "posited," or "given." This highlights the positivist's emphasis on a rigorously scientific empiricist approach designed to produce genuine facts and data that is free from bias or human interpretation. A researcher who takes an extreme positivist stance would regard organizations and other social entities as real in the same sense that natural events and physical objects are real. According to epistemology philosophical stance, the researcher would focus on discovering observable and measurable facts and patterns, and only phenomena that the researcher can observe, and measure would lead to the production of credible and meaningful data (Crotty, 1998). The researcher would look for causal relationships in the data to create law-like generalizations like those produced by scientists. The researcher would use these universal rules and laws to help the researcher to explain and predict behavior and events in organizations. As positivist researchers, the investigator might use existing theory to develop hypotheses.

Critical realism concerns explaining what we see and feel in terms of the basic structures of reality that influence the observed events. According to critical realists, reality is independent and external, nevertheless it is not directly accessible to us through observation and knowledge. Instead, what we experience is ‘the empirical’, which are some of the exhibits of the things in the real world, rather than the actual things. According to critical realism, understanding the world involves two primary phases. First, there are the sensations and events we go through. Second, there is the mental process that goes on sometime after the experience, when we ‘reason backwards’ from our experiences to the underlying reality that may have caused them.

Interpretivism underscore that human beings are distinct from physical events because they give meaning to things. Interpretivists contend that humans and their social environments cannot be examined in the same way as physical phenomena, hence, social science research must be different from natural science research rather than attempt to imitate it. As diverse

people have different cultural backgrounds, people under different circumstances and at different times make different meanings. As a result, people create and experience different social realities, therefore, interpretivists are critical of the positivist attempts to discover definite, universal 'laws' that apply to everybody. Instead, they believe rich insights of humanity might be lost if such complexity is reduced entirely to a series of law-like generalizations.

Postmodernism underlines the role of language and of power relations, pursuing to question established ways of thinking and give voice to alternative disregarded opinions. Postmodernists criticize positivism and objectivism much more than interpretivists, attributing greater significance to the role of language. Postmodernists disregard the modern objectivist, realist ontology of things, instead, they focus on the chaotic primacy of flux, movement, fluidity and change. They assert that any sense of order is provisional and foundationless and can only be achieved by using our language's classifications and categories (Chia, 2005). According to Calás and Smircich (2019), postmodernist scholars aim to reveal and challenge the power dynamics that uphold prevailing realities. In order to look for instabilities inside their widely accepted truths and for what hasn't been discussed, absences and silences formed in the shadow of such facts, this involves "deconstructing" these realities as though they were texts (Derrida, 2016).

Pragmatism states that ideas are only important when they encourage action (Kelemen, 2008). It attempts to bring together both objectivism and subjectivism, facts and values, accurate and rigorous knowledge and different contextualized experiences. Pragmatists view reality as the tangible results of ideas, and they respect knowledge because it makes actions possible. It accomplishes this by considering theories, concepts, ideas, hypotheses and research findings not in an abstract form, but in terms of the roles they play as means of thought and action, and in terms of their real consequences in specific circumstances. Reality is vital to pragmatists as practical effects of ideas, and knowledge is valued for enabling actions to be undertaken successfully. Table 3.1 summarises the comparisons of the main research philosophies from the perspectives of methodology, ontology, axiology, and epistemology.

Table 3.1: Comparison of research philosophies in business and management research

Ontology (nature of reality or being)	**Epistemology** (what constitutes acceptable knowledge)	**Axiology** (role of values)	**Typical methods**

Positivism			
Real, external, independent One true reality (universalism) Granular (things) Ordered	Scientific method Observable and measurable facts Law-like generalisations Numbers Causal explanation and prediction as contribution	Value-free research Researcher is detached, neutral and independent of what is researched Researcher maintains objective stance	Typically deductive, highly structured, large samples, measurement, typically quantitative methods of analysis, but a range of data can be analysed
Critical realism			
Stratified/layered (the empirical, the actual and the real) External, independent Intransient Objective structures Causal mechanisms	Epistemological relativism Knowledge historically situated and transient Facts are social constructions Historical causal explanation as contribution	Value-laden research Researcher acknowledges bias by world views, cultural experience and upbringing Researcher tries to minimise bias and errors Researcher is as objective as possible	Retroductive, in depth historically situated analysis of preexisting structures and emerging agency Range of methods and data types to fit subject matter
Interpretivism			
Complex, rich Socially constructed through culture and language Multiple meanings, interpretations, realities Flux of processes, experiences, practices	Theories and concepts too simplistic Focus on narratives, stories, perceptions and interpretations New understandings and worldviews as contribution	Value-bound research Researchers are part of what is researched, subjective Researcher interpretations key to contribution Researcher reflexive	Typically inductive Small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted
Postmodernism			
Nominal Complex, rich Socially constructed through power relations Some meanings, interpretations, realities are dominated and silenced by others Flux of processes, experiences, practices	What counts as 'truth' and 'knowledge' is decided by dominant ideologies Focus on absences, silences and oppressed/repressed meanings, interpretations and voices Exposure of power relations and challenge of dominant views as contribution	Value-constituted research Researcher and research embedded in power relations Some research narratives are repressed and silenced at the expense of others Researcher radically reflexive	Typically deconstructive reading texts and realities against themselves In-depth investigations of anomalies, silences and absences Range of data types, typically qualitative methods of analysis
Pragmatism			

Complex, rich, external 'Reality' is the practical consequences of ideas Flux of processes, experiences and practices	Practical meaning of knowledge in specific contexts 'True' theories and knowledge are those that enable successful action Focus on problems, practices and relevance Problem solving and informed future practice as contribution	Value-driven research Research initiated and sustained by researcher's doubts and beliefs Researcher reflexive	Following research problem and research question Range of methods: mixed, multiple, qualitative, quantitative, action research Emphasis on practical solutions and outcomes

Source Saunders, Lewis and Thornhill (2023, p.146)

The thorough summary of the five major research philosophies in management research supports this study to select the appropriate research philosophy to successfully address the research questions. The most often used research philosophies in supply chain management (SCM) and addresses the philosophical stance of this thesis along with its justification are presented in the next section. All researchers, including the supply chain and operations management specialist who deals with gathering and analysing "facts" may arguably hold this position (Saunders et al., 2009).

3.2.1 Research philosophies of this study

After discussing the main philosophies and approaches in business and management research, the next step was to choose right research philosophy for this study. The preferred philosophical stance for this research is the positivist approach, which contends that the research knowledge is " real, external, and independent" and observable in the natural world. Accordingly, a researcher who views data as necessary resources from which facts can be derived, that is, like the philosophical stance of a natural scientist. The main objective of this study is to carry out an empirical investigation with real data collected from respondents in the Ethiopian coffee industry, which is consistent with positivism philosophical stance. According to Bell, Bryman and Harley (2022) research knowledge can be observed and investigated empirically, besides, the researcher believed that the social world may be subjected to the same methods of examination as physical science, the positivist paradigm is chosen as the philosophical stance of this study. As presented earlier, the positivist paradigm aims to test and validate theories empirically as well as construct theories by establishing causal relationships between variables (Saunders, Lewis and Thornhill, 2023). This aligns with discussion in the concept development chapter, the theoretical foundations that links the research model and research hypotheses to theories adhere to positivist principles. The

positivist approach entails developing the research model based on relevant theories, hence, this study aims to generate hypotheses that are experimentally explored to derive facts about the impact of critical factors on the adoption of sustainability initiatives, and the effect of SSCM practices on performance outcomes. Furthermore, the positivism stance is supported by the fact that it pertains to the supposed explanatory research objective of comprehending causal relationships as opposed to gaining the more comprehensive and in-depth comprehension of a specific phenomenon that an interpretivism stance would enable (Saunders, Lewis and Thornhill, 2023). Moreover, positivism philosophically supports the development of the research model and its relationship to pertinent theories needed for theory testing, which is central to the goals of this study, the researcher believe it is justified and appropriate for this investigation.

3.3.2 Research approach of the study

The primary research approaches that are frequently employed in social areas of management and business are deductive, inductive, and abductive. These research approaches are portrayed in the second outer layer of the "onion" proposed by Saunders, Lewis and Thornhill (2023), as shown in Figure 3.1. In addition, summary of the main characteristics of the research approaches is exhibited in Table 3.2.

1. Deduction approach

Deductive reasoning appears when the conclusion is obtained logically from a set of theory-derived premises, the conclusion being true when all the premises are true (Ketokivi and Mantere, 2010). It entails formulating a theory and then putting it to the test rigorously through a series of propositions. As a result, it is the most common method for developing theories in natural science research, where rules provide the foundation for explanation, enable the anticipation of phenomena, predict their occurrence, and, as a result, permit their control. Blaikie and Priest (2019) have proposed a list of logical steps which can be used to employ a deductive approach:

i. Propose a provisional idea, a premise, a hypothesis, a testable proposition regarding the relationship between two or more concepts, or set of hypotheses to develop a theory.

ii. Referring the existing literature and specifying the conditions under which the theory is expected to hold, deduce a testable two or more propositions.

iii. Examine the premises and the logic of the argument that produced them, comparing this argument with existing theories to see if it offers an advance in understanding.

iv. Test the premises by gathering appropriate data to measure the concepts or variables and analysing them.

v. If the results of the analysis are not consistent with the premises, the theory is false and must either be rejected or modified and the process resumed.

vi. If the results of the analysis are consistent with the premises, then the theory is validated.

As per Saunders, Lewis and Thornhill (2023) the deductive approach, which is a scientific methodology that prioritises structure, quantification, generalisability, and testable hypotheses, is most likely underpinned by positivist research philosophy.

2. Induction approach

An inductive approach is used when study begins by gathering facts to investigate a phenomenon and then develop or construct theory, often in the form of a conceptual framework. It involves collecting data to explore a phenomenon, identify themes and explain patterns, to generate a new or modify an existing theory that subsequently test through additional data collection. Social science researchers were critical of a reasoning approach that enabled a cause–effect link to be made between particular variables without an understanding of the way in which humans interpreted their social world. Developing such an understanding is, of course, the strength of an inductive approach. Research employing an inductive approach to reasoning is expected to be particularly concerned with the context in which such events take place. Hence, research with a small sample of subjects might be more appropriate than a large number as with the deductive approach. Due to its association to humanities and its emphasis on the importance of subjective interpretations, the inductive approach is most likely to be informed by the interpretivist philosophy.

3. Abductive approach

Unlike the deduction approach that moves from theory to data and an induction approach that goes from data to theory, an abductive approach moves between data and theory, making comparisons and interpretations, in effect applying a combination of deduction and induction (Suddaby, 2006). Therefore, the abductive theory development is open and sensitive to data while also using prior theories to help identify and interpret patterns. Due to the flexible nature of the abductive approach, it can be applied by researchers within

different research philosophies. Hence, a well-developed abductive approach is most likely to be underpinned either by pragmatism, postmodernism, or critical realism.

Table 3.2: Summary of the research approaches and philosophies

	Deduction	**Induction**	**Abduction**
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalizability	Generalizing from the general to the specific	Generalizing from the specific to the general	Generalizing from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory
Philosophical underpinning	Positivism	Interpretivism	Critical realism, Postmodernism, Pragmatism

Source: Saunders, Lewis and Thornhill (2023, p.155)

After going over the key characteristics of the various research approaches in social science, the researcher can now select the best research approach for this study with confidence. Considering the concepts discussed in the previous chapter, the selected research approach to be used in this study is deductive approach, which uses theory to arrive at a logical understanding of a particular problem. The deductive approach involves developing a theoretical or conceptual structure based on a review of the existing literature before testing it empirically (Bryman, 2016), this enables research in theory-testing regarding current knowledge, which is one of the objectives of the study. Deduction is a research approach used for hypothesis testing in the majority of supply chain and operations management studies that employ quantitative methods (Chicksand et al., 2012).

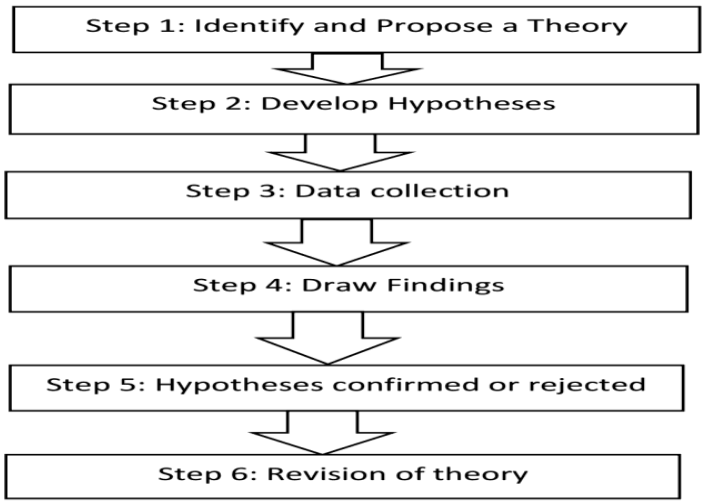


Figure 3.2: The process of the deduction approach
Source: Bell, Bryman and Harley (2022, p.21)

The process of deduction as depicted in Figure 3.2, was consistently applied in the literature review and conceptual development chapters of this thesis. To obtain a rational knowledge regarding the critical factors to adopt sustainability initiatives, the implementation SSCM practices, and performance outcomes from the theories, this study has started reviewing the literature on SSCM in accordance with the deductive approach. Using the deductive method, more detailed hypotheses were then proposed after a review of the relevant theoretical setting presented in the existing literature. As a result, the theoretical framework comprising causal relationships has been developed with the pertinent theoretical understanding and then subjected to a test in an empirical context. The application of such a deductive strategy, as recommended by Bell, Bryman and Harley (2022), will culminate in a logical conclusion based on the proposed hypotheses being confirmed or refuted. In addition, as per Saunders, Lewis and Thornhill (2023) from philosophical perspective, the deductive approach employs "logic" to extract the facts, which is also in line with the positivist paradigm. This shows that the adopted research philosophy and research approach are appropriately consistent, demonstrating the thorough philosophical analysis of this study. Thus, following the deductive process the deductive approach is used as the research approach for this thesis. Consequently, this study has used both the positivism philosophy and the deductive approach in combination to develop theory and validate it empirically.

3.3 Research strategy

Research strategy is the methodological linkage between the research philosophy and the subsequent choice of data collection and analysis techniques (Denzin and Lincoln, 2018). In the fields of business and management, there are several research strategies and methodological options resulting in different combinations of quantitative, qualitative, and mixed methods of research designs (Saunders, Lewis and Thornhill, 2023). As per Creswell and Creswell (2017), unlike to research methodology a research strategy functions at a more applied level of methodology for the purpose to provide more precise guidance. Nevertheless, in this study the researcher considers research strategy and research methodology as an overarching concept that integrates the practical considerations of both research strategy and methodology, as can be seen from Figure 3.3, adopting an approach applied by many researchers in business and management research. Several scholars in social science research claim that eight main research strategies widely employed in business and management research are experiment, survey, case study, action research, grounded theory, ethnography, narrative inquiry, and archive research (Bryman, 2016; Bell, Bryman and Harley, 2022; Saunders, Lewis and Thornhill, 2023). These strategies can be used according to the purpose of the research and the research question indicates whether the purpose is exploratory, descriptive, explanatory, evaluative or a combination of these (Yin, 2018; Saunders, Lewis and Thornhill, 2023). The seven main research strategies extensively utilized in business and management research are described by Saunders, Lewis and Thornhill (2023) as follows:

Experiment: an experiment strategy is used to examine the probability of a change in an independent variable causing a variation in dependent variable. This strategy originates from laboratory-based research and most commonly applied in natural sciences, wildly useful in psychological and social science research, and is often regarded as the ‘gold standard’ against which the rigour of other strategies is assessed.

Survey: the survey strategy is typically used to address the "what," "who," "where," "how much," and "how many" questions and is usually linked to a deductive research approach. As a result, it frequently appears in descriptive, exploratory, and explanatory research, generating models of the relationships between variables and offering potential explanations for them. Questionnaire-based survey techniques are widely used because they make it

possible to obtain standardised data from a large number of respondents at a reasonable cost, enabling comparisons simple.

Ethnography: it is a strategy that uses first-hand observation to describe and analyse the social or cultural environment of a group of people. It actually means a written description of a people or ethnic group. Ethnographic researchers examine people who are in groups, interact with one another, in a street setting, a workplace, and share a common space in an organization, or a society.

Archival research strategy: it considers manuscripts, papers, administrative records, objects, sound, and audio-visual materials held in archives, special collections and other repositories as the primary sources of data. Both official and private documents are used as data sources in a documentary research strategy.

Narrative inquiry: it is a story, a personal account that explains an event or series of events. When using the word "narrative," it is necessary to distinguish between its general meaning and the one that is used here. A qualitative research interview involves a participant and will engage in storytelling, the term "narrative" can be used broadly to characterise the format or results of a qualitative interview. However, Narrative Inquiry as a research approach entails gathering experiences from participants as whole narratives or reconstructing them into stories.

Grounded theory: it provides distinctive step-by-step instructions for applying qualitative methods inductively to develop theory from data. In a variety of settings, it is employed to develop theoretical justifications for social interactions and processes. Since many facets of management and business involve human behaviour, such as that of customers or employees, a Grounded Theory approach can be applied to investigate a variety of management and business-related issues.

Case study: it is an in-depth investigation of a subject or phenomenon within its real-life context (Yin, 2018). In case study research, the term "case" may refer to a person, group, organization, association, process, or event, among other things. One of the most important aspects of defining a case study is selecting the case to be examined and determining the parameters of the investigation (Flyvbjerg, 2011). A case study strategy has the ability to produce insights from detailed and in-depth investigation into the study of a phenomenon in its real-life setting, can result in rich, empirical descriptions and the development of theory (Yin, 2018).

Action research: it is an iterative aspect and emergent process of inquiry is meant to develop solutions to actual organizational problems through a collaborative and participatory approach, utilizes various forms of knowledge and will have consequences for participants and the organization beyond the research project (Coghlan, 2011; Coghlan, 2019). It is suitable to identify problems, design solutions, take action, then assess that activity in order to foster organizational learning and yield useful results.

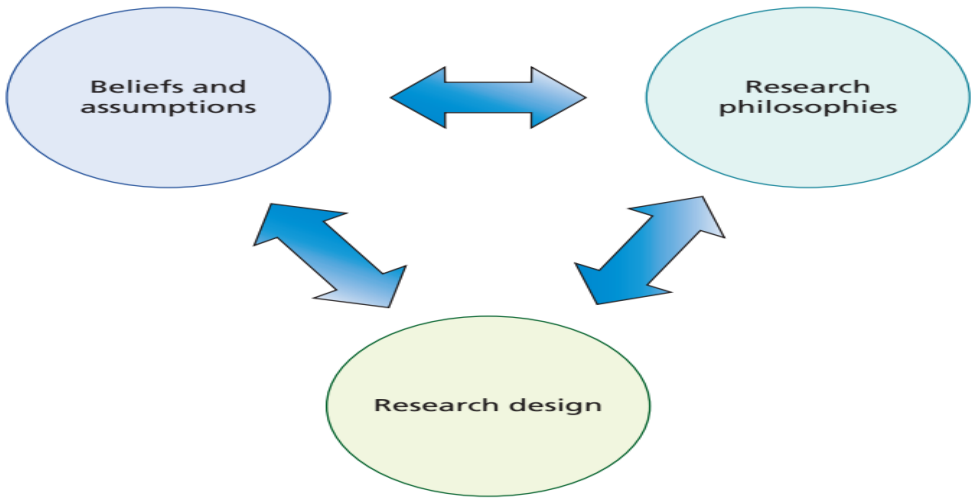


Figure 3.3: Development of research philosophy as a reflexive process
Source: Saunders, Lewis and Thornhill (2023, p.133)

Considering the eight research strategies discussed relevant for business and management research, the researcher has determined the appropriate research strategy for this study. In social science, the choice of research strategy is determined by the type of research questions; therefore, the research strategy to be applied in a study should be chosen in accordance with the research questions (Bryman, 2016). As per Saunders et al. (2009), the ability to answer the research questions, the ability to meet the research objectives, consistency with the philosophical considerations, availability of research resources, and the boundary of existing knowledge are the major factors that should be considered in choosing the research strategy. Hence, in light of the aforementioned criteria a survey strategy was chosen as the research strategy for this study, since this strategy enables the study to accomplish its main objectives and provide answers to the proposed research questions. In addition, the deductive research approach is entwined with the survey strategy as it often

entails an empirical analysis of a theoretical framework following an approach of validating an existing knowledge (Bell, Bryman and Harley, 2022). The survey strategy and the deductive research approach are intertwined with the purpose of the study, which is called explanatory research. According to Saunders, Lewis and Thornhill (2023), explanatory study helps to establish causal relationships between variables, and the overarching research questions often start with or includes "Why" or "How". Explanatory research focusses on understanding a scenario, problem and elucidating the relationships between variables (Saunders, Lewis and Thornhill, 2023), that is, establishing a linkage among certain constructs of a proposed conceptual framework. As illustrated by Bryman (2016), explanatory research is of undertaken via survey or experiments.

The main questions of this study are concerned with understanding the critical factors that determine the adoption of sustainability initiatives, the environmental and social sustainability practices and the performance paybacks of implementing SSCM practices. Moreover, the core objective of the research is to craft a conceptual framework by establishing relationships between the critical factors, the environmental and social sustainability practices and the performance paybacks. To address the research questions and accomplish the objectives, it requires to undertake empirical analysis to establish a relationship between the constructs of the research model. Therefore, the researcher believed that explanatory research is appropriate to answer the main questions of the study as well as achieve the core research objectives.

3.4 Methodological choice of this research

After discussing the right research approach, this part briefly discusses the choice of research method, which is another layer of our research "onion". The quantitative method, which focusses on numerical data, and the qualitative method, which focusses on non-numeric data, are the two primary data gathering approaches in business and management research (Saunders, Lewis and Thornhill, 2023). According to Creswell and Creswell (2017), the qualitative method is mostly associated with interviews technique of data collection, whereas the quantitative method is primarily associated with questionnaire data gathering instrument. A single data collecting approach known as mono method or several data collection techniques also called many methods are the two options available to researchers (Saunders, Lewis and Thornhill, 2023). The mono method focusses on either quantitative or

qualitative procedures, but the multiple methods approach includes both mixed and multi-methods, both of which involve additional sub-methods. According to Saunders, Lewis and Thornhill (2023), mixed methods use both quantitative and qualitative approaches either simultaneously or sequentially, while multi-methods use multiple quantitative or qualitative techniques.

Generally, researchers determine the research method for their study based on the research questions, in a manner that enables them to accomplish their research objectives and eventually address the research questions (Creswell and Creswell, 2017). The alternative research methods in business and management research are illustrated in Figure 3.4.

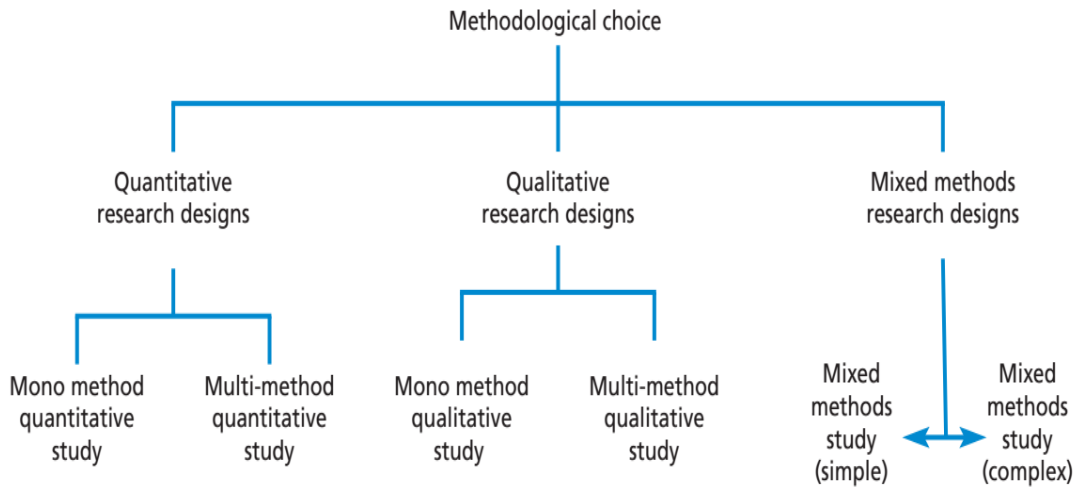


Figure 3.4: Methodological choice
Source: Saunders, Lewis and Thornhill (2023, p.182)

In accordance with the chosen research philosophy - the positivist paradigm, and the preferred research approach - the deductive approach, this study selected a single quantitative method to examine the existing body of knowledge. Therefore, the researcher used a mono quantitative method considering the selected research philosophy, that is the positivist paradigm, and research approach, that is deductive logic which deals with examining the existing knowledge. The mono quantitative approach is suitable for this thesis and considered sufficient as it can conduct the empirical analysis needed to address the research questions. Bell, Bryman and Harley (2022), have elucidated the essential criteria for both quantitative and qualitative approaches regarding research philosophy, research approach, and role of theory in relation to research. Hence, the researcher has chosen to apply the

quantitative approach for this research based on these standards. The proposed fundamental criteria in quantitative and qualitative methods are depicted in Table 3.3.

Table 3.3: The fundamental criteria in quantitative and qualitative methods

	Quantitative	**Qualitative**
Philosophical position	Natural science model, in particular positivism	Interpretivism
Research approach (logic of the research)	Deductive	Inductive
Role of theory (in relation to research)	Testing of theory	Generation of theory

Source: Bell, Bryman and Harley (2022)

The primary drawback of employing mixed approaches as an alternate strategy is the need to justify the chosen course of action. Since the mono technique was judged sufficient for this research, using mixed methods in this research might have made the study's research approach more difficult. Since diverse data gathering procedures may provide conflicting findings, mixed methods frequently pose a threat to reliability (Mangan, Lalwani and Gardner, 2004). Furthermore, critics frequently point to mixed techniques as the reason why a single approach is insufficient for conducting an empirical investigation of a given phenomenon (Golicic and Davis, 2012). In light of these arguments, the researcher decided not to use mixed techniques in this study because they require additional resources which is beyond more time and budget resources available for this research. Furthermore, since it is inconsistent with the study methodology and philosophical position, the qualitative approach was disregarded. As a result, this thesis uses a single quantitative survey to investigate how critical factors determine the adoption of sustainability initiatives, and the implementation of SSCM affects the performance outcomes organizations. In this approach, the survey is considered the proper research strategy, and the mono quantitative method is the chosen research method.

3.5 Research time horizon

Saunders, Lewis and Thornhill (2023), assert that the time horizons of research designs are not influenced through the choice of approach and methods for the study. This highlights the need to explicitly address the research's temporal horizon in order to further illustrate the process's rigour. An important aspect to be addressed in designing research is, whether to make the study to be a “snapshot” taken at a particular time or to be more similar a ‘diary’ to a series of snapshots and be a representation of events over a given period’. This will, of

course, depends on the research question. The 'snapshot' time horizon is called cross-sectional, while the 'diary' perspective is known as longitudinal. The two types of research designs in terms of time horizon are described as follows:

3.5.1 Types of research in terms of time horizon

Cross-sectional study: this study design concerns the study of a particular phenomenon or phenomena at a particular time (Saunders, Lewis and Thornhill, 2023). Even though the cross-sectional approach is primarily associated with the quantitative method, it can also use qualitative methods because certain case studies are based on interviews to be done over a brief period of time at a specific point in time (Yin, 2018). Additionally, since cross-sectional research only looks at one point in time, it is compatible with positivism paradigm because with this type of time horizon researchers do not have the ability to exercise a measure of control over the phenomena they are studying (Bryman, 2016).

Longitudinal study: it typically examines a phenomenon (or phenomena) at multiple points in time, providing a comprehensive and information-rich understanding of the issue under study, which is frequently associated to case studies (Yin, 2003). Longitudinal studies may apply quantitative, qualitative and mixed methods research designs combined with a wide variety of strategies. Unlike the cross sectional studies, longitudinal studies may provide researchers with a measure of control over some of the variables under study (Saunders, Lewis and Thornhill, 2023).

3.5.2 Research time horizon of this study

Researchers may apply different time horizons considering the research questions and circumstances since these parameters determine the use time in research (De Vaus and de Vaus, 2013; Saunders, Lewis and Thornhill, 2023). Accordingly, based on the research questions of the study as well as the limited time and budget available for the research project, the researcher has chosen the cross-sectional research methods to apply in this study. Hence, this study was undertaken by collecting a 'snapshot' data in from the respondents in the Ethiopian coffee industry to address the research questions and achieve the objectives of the study. This study uses empirical observations that is a data collected at a certain point in time to empirically validate the proposed conceptual model of the study. Besides, for this study has disregarded the longitudinal strategy since measuring any developments or changes in the SSCM practices or analyse their effects over time is not the aim of the research.

Furthermore, the survey strategy is frequently used in cross-sectional studies since it makes it easier to examine a specific event or phenomena at a certain moment in time (Saunders et al., 2009). This shows that reasonable consistency between the preferred research strategy and the time horizon for this study. Additionally, the chosen cross-sectional method is consistent with the positivist philosophical stance and is ideally fit to the quantitative data collection technique (Bell, Bryman and Harley, 2022). Thus, based on all these factors, the cross-sectional technique is supposed to be the most right and proper time horizon for this study.

3.6 Data collection technique

After discussing and determining the research philosophy, research approach, research strategy, research method and research design, in this section the appropriate data collection for this study is discussed. Questionnaire is the most frequently applied instrument to collect data for surveys in supply chain and operations management research (Forza, 2002; Saunders, Lewis and Thornhill, 2023). Generally, the term questionnaire refers to all the procedures for data collection in which every person is requested to respond to the same set of questions in a predetermined order (De Vaus and de Vaus, 2013). Thus, the term questionnaire encompasses both self-completed surveys, in which the respondent answers the questions without the presence of the researcher, and those in which the researcher completes on behalf of the respondents (Saunders, Lewis and Thornhill, 2023). Questionnaire provides an efficient way of collecting data from many respondents, however, it might be difficult for researchers to prepare a good questionnaire (Bell and Waters, 2018; Saunders, Lewis and Thornhill, 2023). Questionnaires tend to be used for analytical or explanatory research, which enables the researcher to examine and explain relationships between variables, specifically the cause-and-effect relationships between the variables or constructs (Saunders, Lewis and Thornhill, 2023).

Bell, Bryman and Harley (2022) stated that the choice of data collection method is largely influenced by the resources available for data collection, predominantly time and money, the researcher's experience, and the level of accuracy needed. Given this, the survey questionnaire appears to be appropriate since it can offer a quick, accurate, affordable, and effective means of gathering the data needed to answer the study questions (Forza, 2002). The described purposes of the questionnaire are consistent with the main objectives of the

study to examine and explain the key critical factors that determine the adoption of SSCM initiatives, the environmental and social sustainability practices, and the commensurate performance outcomes as well as establishing the relationships between these constructs. In a nutshell, considering the advantages and the functions of questionnaire as well as compatibility with the main objectives of this study, the researcher has used questionnaire as an instrument to collect primary data from selected respondents in the Ethiopian coffee industry.

3.6.1 Types of questionnaires

In business and management research, there are two primary types of questionnaires: interviewer-administered questionnaires, which include structured interviews and telephone questionnaires, where the researcher is present, and self-administered questionnaires, which include internet-mediated, postal, and delivery-collection questionnaires (Saunders, Lewis and Thornhill, 2023). Figure 3.5 exhibits the different types of questionnaires which can be employed in business and management research.

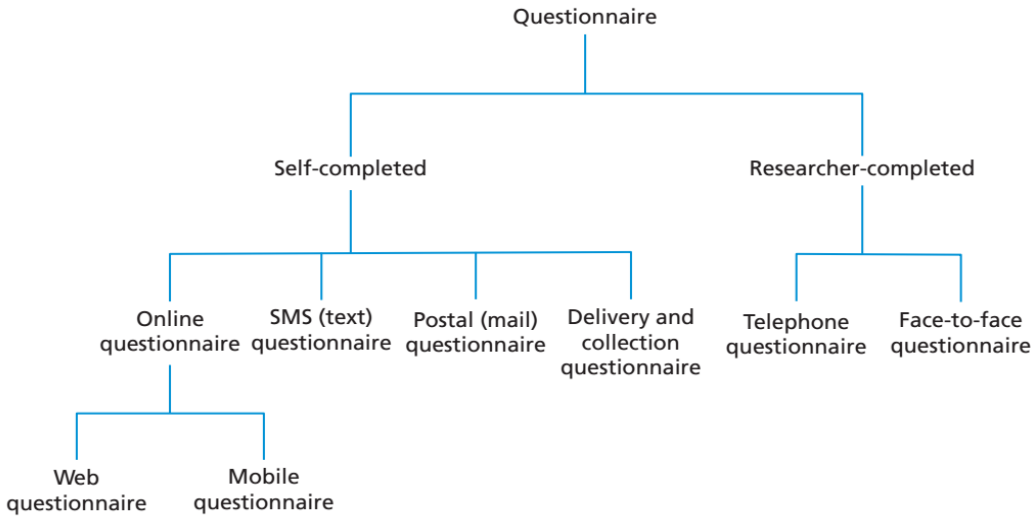


Figure 3.5: Types of survey questionnaires
Source: Saunders, Lewis and Thornhill (2023, p.510)

Based on the approach used to reach out respondents and distribute the questionnaire, Saunders, Lewis and Thornhill (2023), have discussed the different types of questionnaires as follows:

Online questionnaires: for both mobile and web questionnaires, it is crucial to establish a well-defined schedule that specifies the activities and resources required. In order to get a favourable response, the recipient must be inspired to complete the questionnaire and send

it back. Although the visual appearance and covering email will help to guarantee a high level of response, it is important to keep in mind that, in contrast to postal and delivery and collection surveys, the responder and the researcher may view different visuals on their screens.

SMS questionnaires: typically, SMS (text) questionnaires are used to get feedback right away following an event, such as purchase delivery. The introduction for these surveys is always brief and can be sent by text message. SMS surveys, which often consist of only a few questions, are distributed to participants' mobile phones via cloud-based survey software. One question is presented at a time, with follow-up questions only being presented after a previous question has been addressed.

Postal questionnaires: these require a clear and succinct cover letter as well as an attractive graphic presentation to help guarantee a high level of response. A well-defined schedule and a well-conducted administration procedure are crucial, similar to online questionnaire. Furthermore, De Vaus and de Vaus (2013) suggests assigning a distinct identification number to every questionnaire, which is noted on the receivers' list. This facilitates checking and following up with non-respondents.

Delivery and collection questionnaires: in the case of questionnaire delivery and collection, the researcher or a research assistant will make the delivery and call to pick up the questionnaire. The covering letter should therefore specify the anticipated time of questionnaire collection. Follow-ups can be employed, such as contacting at different times of day and on different days to try to reach the respondent, just like with postal questionnaires.

Telephone questionnaires: the researcher's ability to conduct interviews will have an impact on the quality of data gathered through telephone questionnaire.

Face-to-face questionnaires: many of the abilities needed for in-depth and semi-structured interviews are also used while conducting questionnaires in person. The response rate will be impacted by factors including the researcher's appearance and level of preparation.

3.6.2 The choice of questionnaire

As per Saunders, Lewis and Thornhill (2023), the choice of survey questionnaire as well as the completion mode and medium is influenced by a variety of reasons related to the research questions and objectives, and in particular by the following factors:

- Characteristics of the respondents from whom data is to be collected.
- Significance of reaching a specific individual as a respondent.
- Significance of answers from respondents not being contaminated or distorted.
- Size of the sample you need for the analysis, considering the likely response rate.
- Types and numbers of questions the researcher must ask to collect the data.
- Time available to undertake the data collection.
- Cost implications for the collection and data entry.
- Availability of field workers and research assistants.
- Cloud-based survey design, data collection and analysis software.

Among the alternative questionnaire types, the telephone questionnaire, postal questionnaire, SMS questionnaire, and online questionnaire are not applicable for this study due poor internet access and speed, the high number of questions in the questionnaire and low literacy of respondents to internet and mobile based questionnaire, and the underdeveloped infrastructure in Ethiopia. The face-to-face questionnaire option was not feasible since the study require the collection of data from large number of respondents. Therefore, the delivery and collection questionnaire type is chosen and used as the data collection instrument for this study in light of the factors that determine the choice of survey questionnaire and accordance with our primary research question. Table 3.4 summarizes the main attributes of the selected data collection instrument for this study, that is, the delivery and collection questionnaire.

Table 3.4: Main attributes delivery and collection questionnaire

Attribute	**Delivery and collection questionnaire**
Population's characteristics for which suitable	Literate individuals who can be contacted by post; selected by name, household, organization, etc.
Confidence that the right person has responded	Low but can be checked at collection
Likelihood of contamination or distortion of respondent's answer	May be contaminated by consultation with others
Size of sample	Dependent on number of field workers
Likely response rate	Variable, 30-50% reasonable
Suitable types of question	Closed questions but not too complex; simple sequencing only; must be of interest to respondent
Time taken to complete collection	Dependent on sample size, number of research assistants, etc.
Main financial resource implications	Research assistants, travel, photocopying, clerical support, data entry

Role of researcher/ research assistants in data collection	Delivery and collection of questionnaires; enhancing respondent participation
Data input	Closed questions can be designed so that responses may be entered using optical mark readers after the questionnaire has been returned

Source: Saunders, Lewis and Thornhill (2023)

3.6.3 Design of the questionnaire

After determining the right questionnaire type and delivery technique, the researcher proceed to the design of survey questionnaire. The researcher has considered the steps proposed by Hair, Page and Brunsveld (2020, p.275), in designing the questionnaire for this study since the steps are helpful for developing a reliable questionnaire. The steps to be used in the design of a questionnaire are presented as follows:

Step 1: Initial considerations

- Clarify the nature of the research problem and objectives.
- Develop research questions to meet research objectives.
- Define target population and sampling frame (identify potential respondents).
- Determine sampling approach, sample size, and expected response rate.
- Make a preliminary decision about the method of data collection.

Accordingly, in the first step the researcher has determined the required empirical data to address the research questions and objectives and then the type of questionnaire was specified along with itsmethod of administration as can be seen from section 3.6.1 and 3.6.2.

Step 2: Clarifying concepts

- Ensure the concept(s) can be clearly defined.
- Select the variables/indicators to represent the concepts.
- Determine the level of measurement.

As explained in this step, the data required for the study to address the research questions and specific objectives was sought based on the research constructs and their definitions.

Step 3: Determining question types, format, and sequence

- Determine the types of questions to include and their order.
- Check the wording and coding of questions.
- Decide on the grouping of the questions and the overall length of the questionnaire.
- Determine the structure and layout of the questionnaire.

Hence, for this study the contents of individual questions were determined to ensure the content validity. The rigorous literature review and analysis enabled the researcher to spot an appropriate set of questions from similar previous studies. Therefore, the identification of appropriate set of questions and measurement items from existing studies that have been used by various authors indicate that there was no need to develop a new set of questions. Moreover, the form of response to each question was determined, a five-point Likert type method of summated ratings was used in the questionnaire. The wording of each question in the questionnaire was also determined. Each question was presented in the simplest way possible in order to avoidany potential ambiguity. In addition to wording, sequence of the questions is a very important factor that ensures a logical flow. Thus, structure, layout and sequence of questions was given a due attention in designing the questionnaire to ensure a logical flow. Once the contents and questions of the questionnaire had been initially completed, a detailed proof reading and re-examination of the whole questionnaire was carried out.

Step 4: Pretesting and pilot testing the questionnaire

- Determine the nature of the pretest for the preliminary questionnaire.
- Decide which individuals and how many will review the questionnaire.
- Ask for comments on instructions for completing questions, the sequence of questions, and any difficulties in responding to questions.
- Analyze initial data to identify the limitations of the preliminary questionnaire.
- Revise questionnaire instructions, sequence, wording, length, as needed.
- Collect data from a sample similar to the final respondents. The size of the pretest sample is determined based on the number of questions.

As described by Van Teijlingen and Hundley (2010) and Polit and Beck (2020), pilot study is the mini version of a full-scale study and can serve to pre-test data collection instrument. Moreover, pilot study helps in the planning and modification of the research projects by providing early warning of potential failure spots. Primarily, it demonstrates issues with survey administration procedures and questionnaire phrasing and clarity (Forza, 2002). Accordingly, this research conducted a pilot study prior to the main survey to test the appropriateness of the survey questionnaire and assess the feasibility of a full-scale survey. As suggested by Forza (2002), before the commencement of the survey the questionnaire was

submitted to colleagues, industry experts and selected target respondents for review. The responsibility of the colleagues was to determine whether the questionnaire achieves the study objectives or not, and industry experts included to make sure that the questions in the instrument could be understood by the respondents in the coffee industry. Moreover, the participation of some respondents in the pilot survey offers input concerning issues that may have an impact on the targeted respondents' response.

As per Forza (2002), pre-testing a questionnaire should be done in two steps. In the first step, to capture the respondents' input and see how they complete, the researcher completes a questionnaire with a group of selected respondents. In this case the respondents complete the questionnaire just like they would have in the main survey. Throughout the pilot study, the investigator inquired as to whether the guidelines were unambiguous, the questions were understandable, there were difficulties in providing answers to the questions posed and the planned administration procedure would be feasible. In the second step, the investigator conducts a brief pre-test to evaluate the contact administration procedure, collects information to conduct an exploratory evaluation of measurement quality, and clarifies the appropriateness of the measures in relation to the sample.

In this research project, the questionnaire was pretested through the participation of three colleagues, two academic staffs from my employer university and three industry experts from the Ethiopian coffee industry. They were asked to complete the questionnaire, as if they were potential respondents, and to provide feedback on the clarity of the instructions, questions, and answers; the order of the questions and time taken to answer. The respondents were also asked to write any comments and reflections they have on the questionnaire.

As per the feedback obtained from the participants in the pre-test indicated that it takes an average of 20 minutes to complete the questionnaire. In addition, regarding the comments given on the questionnaire in terms of clarity of instructions, the sequence and wording of the questions were discussed with the team of supervisors, and appropriate changes were made in the final questionnaire. Generally, based on the feedback obtained from the pilot survey, the researcher has tried to make sure that the questionnaire is clear, legible and the items comprehensively measure the issues, and the instructions are clearly understood.

Step 5: Administering the questionnaire:

- Identify the best practices for administering the type of questionnaire utilized.
- Train and audit field workers, if required.

- Ensure a process is in place to handle completed questionnaires.
- Determine the deadline and follow-up methods.

Since the survey is conducted using a deliver and collect questionnaire, the researcher has hired three research assistants to facilitate the data collection. The research assistants have had a second degree in the field of study and previous experience in data collection. Moreover, they were given a one-day practical training using the survey questionnaire of the study. The researcher with the support of three research assistants has distributed the survey questionnaire to the selected coffee producing and exporting firms in the based on their addresses obtained from Ethiopian Coffee Association (ECA) database. The questionnaire was designed in a manner that ensures the anonymity of participants and also providing convenience for respondents when they take part in the survey. The researcher has prepared a cover invitation letter to kindly request the participation of the selected firms, as it is realized that firms and respondents may potentially be reluctant to collaborate on surveys. The invitation letter is vital to get the willingness of respondents to participate in the survey. Hence, we included a statement in the invitation letter which states that the survey was being conducted in collaboration with the Liverpool John Moores University, to confirm the purpose of the research as academic, not for commercial.

The data collection was conducted within a period of approximately seven months from July 15, 2023, to 21, February 2024. The survey was officially launched on July 15, 2023; after obtaining the necessary clearance and support from the Ethiopian Coffee and Tea Authority. The participants of the survey were identified based on the database obtained from the ECA members directory. The members directory has the address of 511 coffee producers and exporters. All the 511 companies are considered as target population, and a questionnaire was delivered to all the companies via assistant researchers. In order to increase the response rate, a follow-up telephone call was made to the participants every week until the questionnaires are filled and returned. As a result, the research assistants have managed to collect back the filled questionnaires from 218 companies after seven months. The survey was completed on 21 February 2024 with a response rate of 43%.

3.6.4 Measurement scale development

Since prior studies have already developed a set of validated measurement scales that were helpful for this investigation, the researcher did not need to create new measurement scales

from scratch. Essentially, the measurement scales for the constructs drivers, enablers, and barriers to adopt SSCM initiatives, the environmental and social sustainability practices, and the corresponding performance outcomes are developed on the basis of previous studies (Mangla et al., 2018; Baliga, Raut and Kamble, 2019; Guimarães et al., 2022). For instance, Mangla et al. (2018) have identified and proposed the enablers (ENA) to implement sustainability initiatives in agrifood supply chain in India from developing countries perspective. Moreover, Guimarães et al. (2022) have explored and identified the key drivers (DRI) and barriers (BAR) to adopt sustainable supply chain from viewpoint of the Brazilian coffee industry. Besides, Baliga, Raut and Kamble (2019) have identified the environmental sustainability practices (ESP), the social sustainability practices (SSP) and The outcomes of sustainability performance (OSP) from developing economies perspectives as well as they have developed a measurement scale for the constructs. A questionnaire was developed to collected data regarding the profile of the respondents, their organizations, and responses to questions based on the literature findings of the drivers, enablers and barriers of SSCM. Hence, all the critical factors are rated using the questions in a survey questionnaire and respondents had to indicate the degree to which they agree or disagree with each of the statements on a five-point scale from 1 = fully disagree to 5 = fully agree.

3.7 Data analysis techniques

Researchers have many analytical techniques to analyze the numerical data or information they have collected that can be quantified to enable research questions to be answered. They range from forming simple tables or graphs that show the frequency of occurrence and using statistics such as figures to enable comparisons, through determining statistical relationships between variables, to complex statistical modelling (Saunders, Lewis and Thornhill, 2023). Generally, they can be classified as simple and advanced analytical techniques. Researchers can use the sophisticated methods when the simple approaches cannot adequately explain the data relationships.

According to Hair, Page and Brunsveld (2020), quantitative data analysis involves the following approaches: (1) descriptive statistics to obtain an understanding of the data (2) testing hypotheses using statistical tests. Descriptive statistics are useful to efficiently communicate complex issues and make business research reports more visually appealing. This technique of analysis includes frequency distributions, histograms, bar charts, pie charts,

and line charts, as well as measures of central tendency and dispersion. When researchers conduct hypotheses tests, they are converting data to knowledge. A number of statistical techniques can be used to test hypotheses. The choice of a particular technique depends, first, on the number of variables and, second, on the scale of measurement (Hair, Page and Brunsveld, 2020). The number of variables examined together is a major consideration in the selection of the appropriate statistical technique. A univariate statistical technique involves only one variable at a time to generalize about a population from a sample. Univariate tests of significance are used to test hypotheses when the researcher wishes to test a proposition about a sample characteristic against a known or given standard. Whereas, if the business researcher is interested in the relationship between two variables a bivariate statistical technique is required. When researchers are interested to test hypotheses that one group differs from another group in terms of attitudes, behavior, or some other characteristic, bivariate statistical tests must be used. The scale of measurement used to collect data also determines the choice of hypothesis testing techniques. For example, if the scale type is nominal or ordinal, the appropriate statistical test would be chi square. Besides, if the measurement scale is interval or ratio, the suitable hypothesis test would be t-test or ANOVA test. In addition, there are two main types of statistical procedures: parametric and nonparametric. The key distinction between them lies in the underlying assumptions about the data. When the data is measured using an interval or ratio scale and the sample size is large, parametric statistical procedures are appropriate. It is also assumed the sample data is collected from populations with normal (bell-shaped) distributions. When the assumption of a normal distribution is not possible, the researcher should use nonparametric statistical procedures. Considering the number of variables and the measurement scale of the study as well as the objectives of the study, descriptive statistics and partial least squares structural equation modeling (PLS-SEM) techniques are used as method of analysis.

One of the main objectives of this study is to explore cause-and-effect relationship in order to comprehend how critical factors impact the adoption of SSCM practices and, in turn, performance outcomes. In light of the explanatory purpose of the study and as per Hair et al. (2021), the other appropriate data analysis technique is the partial least squares structural equation modeling (PLS-SEM). PLS-SEM is a second-generation statistical technique for multivariate analysis broadly accepted and used in many research disciplines such as operations and supply chain management research. The main objectives of this study are

perfectly matched with the recommendations for choosing PLS-SEM. Therefore, PLS-SEM technique is used as a statistical tool for the empirical study along with the SmartPLS software, a standard software for the PLS-SEM statistical technique. Partial least squares structural equation modelling (PLS-SEM) is one of the most evolving second-generation statistical tools for multivariate analysis. The other second-generation statistical technique is covariance-based structural equation modelling (CB-SEM) which was popular for publishing articles mostly in social science until 2010, however, in recent time PLS-SEM is becoming a widely used technique in terms of the number of publications as compared to CB-SEM (Hair et al., 2017). The PLS-SEM is often also referred to as PLS path modeling. Hence, the PLS path modeling is briefly discussed to point the components are required in order to develop a PLS path model for this study. As per Hair, Page and Brunsveld (2020), PLS-SEM is becoming popular in business and academic research because it offers a number of reasons such as it can estimate theoretical model with latent variables, data is not required to be normally distributed, the sample size can be quite small or very large, and measures of latent variables can be either metric or nonmetric.

Moreover, the researcher preferred to use SEM considering the nature of the study. First, the study is concerned with testing a theoretical framework from a prediction perspective. Second, the conceptual frame of this research is complex and includes many constructs, indicators, and relationships. Third, the research objectives are to better understand increasing complexity by exploring theoretical extensions of established theories with exploratory research design. Therefore, considering the characteristics of study and capability of the PLS-SEM, the researcher has decided to PLS-SEM to analyze the empirical data and validate the conceptual framework.

3.8 Chapter summary

This chapter outlines the methodology in detail to undertake this study, considering the philosophical and practical perspectives. Regarding the philosophical aspects, this study has adopted a positivist paradigm as the philosophical stance, which in turn influenced the choice of research logic to be deductivism as the study's research approach. Considering the research questions and objectives, the purpose of the study is defined as explanatory research. Due to the nature of the study, the survey research strategy and quantitative research method were applied, which determined the choice regarding the data collection technique and research

time horizon. Essentially, considering the practical nature of the study and in order to maximise replicability and provide a high degree of transparency, thorough descriptions of the several techniques involved in completing this research have been presented, illustrating the rigour of the research process. Figure 3.6 summarizes the research methodology and the research roadmap of the study.

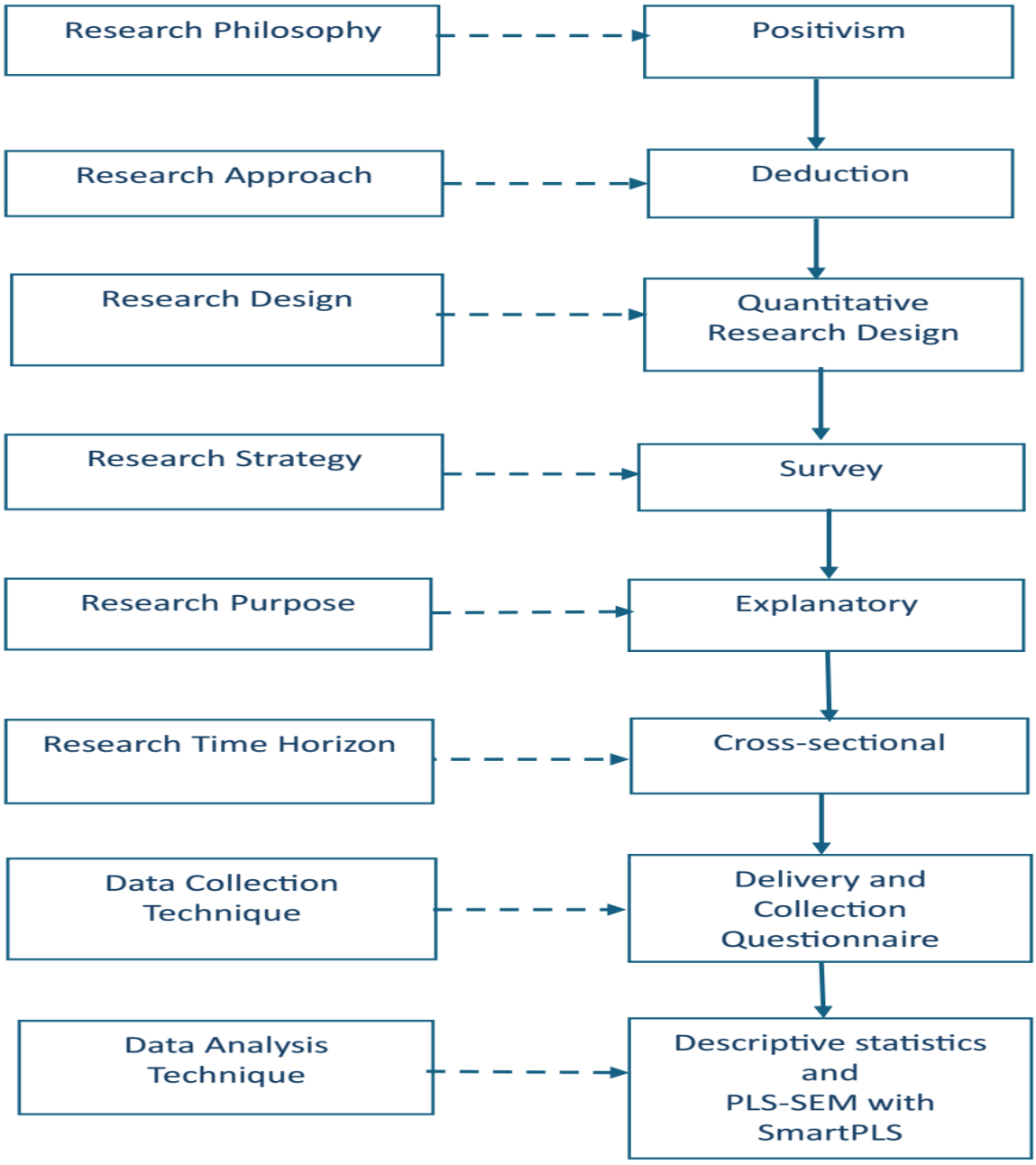


Figure 3.6: The research roadmap of the study

CHAPTER FOUR: CONCEPTUAL FRAMEWORK DEVELOPMENT

4.1 Overview

The chapter begins with a discussion regarding the application of institutional and stakeholder organizational theories in the study. Subsequently, the chapter presents the theoretical justifications for the development of the conceptual framework and the initial model of the study considering the conceptual foundations discussed in the literature review. The chapter utilizes the theoretical themes of the study depicted in the previous chapter, that is, the critical factors, sustainability practices, and performance outcomes, to develop a comprehensive conceptual framework.

The comprehensive conceptual framework is expected to analyze the implementation of the SSCM practices on performance outcomes, considering the impact of the critical factors. Moreover, this chapter proposes theoretically the research hypotheses concerning the effect of critical factors on the adoption of SSCM and the impact of SSCM practices on performance outcomes. Hence, the theoretical relationships between the three research themes are discussed in the hypothesis development section of the chapter. The final section of the chapter exhibits the theoretical framework of the study with an outline of the hypotheses of the research.

4.2 Theoretical lenses

This section presents the application of organizational theories that determine the initiation and implementation of SSCM. In particular, the institutional theory and the stakeholder theory are synthesized and used as a lens in analyzing the critical factors that determine the implementation of SSCM initiatives in agrifood supply chains taking the Ethiopian coffee industry as a case study.

4.2.1 Justification for the selection of the theories

There are several organizational theories that could be applied in business studies. The researcher has chosen institutional theory and stakeholders theory based on the following criteria. Table 4.1 presents the selection criteria with their descriptions.

Table 4.1: Criteria for the selection of theories

S.N	Criteria	Description
1	Purpose of the research	The purpose of the study, which is explanatory, matches with the perspectives of the institutional and stakeholder theories.
2	Research questions	Institutional and stakeholders theories help to address the first research question of the study which is concerned about the critical factors.
3	Literature review result	Institutional and stakeholders theories are the most commonly applied theories by other researchers in SSCM studies.
4	Practical fit	Institutional and stakeholder theories are practical and applicable to the empirical data and study area settings.

Source: author's own work

4.2.2 Institutional theory

Traditionally, institutional theory has focused on how groups and organizations can strengthen their legitimacy and positions by complying to the rules and norms of their institutional environment (Glover et al., 2014). In this context, legitimacy pertains to the implementation of sustainable methods that stakeholders deem appropriate and acceptable (DiMaggio and Powell, 1983). Institutional theory offers a tool by which scholars can investigate factors that validate the legitimacy of organizational practices (Govindan, 2018). In addition, Ketchen Jr and Hult (2007) and Sarkis, Zhu and Lai (2011), have pointed out that institutional theory also highlights the importance of environmental factors and how they affect a company's decision to implement an organizational practice. This encompasses factors such as social context, tradition, history, law, culture, and financial incentives, but it also takes into account the significance of resources (Glover et al., 2014). The theory's primary goal is to recognize how institutions maintain their standing and legitimacy by abiding by the laws and customs of their respective environments (Govindan, 2018). Failure to comply with any of these institutional pressures may lead to multi-scalar penalties, including macro-level penalties on resource efficiency, micro-level litigation or fines, and meso-level penalties on brand loyalty (Glover et al., 2014). According to institutional theory, social and environmental factors which are typically stronger than market forces—can have a substantial impact on how formal structures develop throughout an organization (Ebrahimi and Koh, 2021). Organizations adhere to recently enacted environmental management regulations by governments, which include important SSCM key dimensions. Conforming to the institutional environment is vital for survival of institutions because conformity results in benefits such as

stability, legitimacy, and resource availability (Ball and Craig, 2010). Thus, institutional theory clarifies how changes impact decisions regarding sustainability initiatives (Govindan, 2018). A few examples of these include changes in rules and regulations, advancements in technology, and societal values (Ball and Craig, 2010).

According to institutional theory, there are three forms of drivers which could result in isomorphism in the strategies, structures, and processes of organizations (Glover et al., 2014). These drivers are called coercive, normative, and mimetic (DiMaggio and Powell, 1983). Coercive drivers are created when powerful institutions such as government agencies in powerful positions exert influences on organizations within the supply chain (Govindan, 2018). Therefore, coercive isomorphic drivers are crucial to determine the environmental management and sustainability initiatives of organizations (Ketchen Jr and Hult, 2007), in this case within the coffee supply chain. Normative drivers influence organizations to adapt in order to be recognized as an organization with legitimate activities (Sarkis, Zhu and Lai, 2011). The main normative pressure for organizations results from pressures related to social obligations (Govindan, 2018). In line with this De Haen and Réquillart (2014) confirmed that consumers can play an important role in determining the type of food items that fulfils sustainability criteria and thereby they can contribute to enhancing SSCM practices.

Furthermore, exports and sales to international markets are the main drivers that influence producers to embrace SSCM practices (Sarkis, Zhu and Lai, 2011). Mimetic drivers exist when enterprises imitate the actions of successful competitors in the industry, to replicate the pathway to success and legitimacy (Sarkis, Zhu and Lai, 2011; Govindan, 2018). Mimetic isomorphism is explained as an organizational response to uncertainty, in the absence of a defined plan of action, organizations often imitate the more successful competitors within the industry (Aerts, Cormier and Magnan, 2006). Hence, enterprises in developing countries such as China can learn from their competitors in countries such as Canada, France, and Germany regarding the best practices to implement SSCM (Christmann and Taylor, 2001; Sarkis, Zhu and Lai, 2011). Therefore, from this empirical findings it can be understood that the role of external drivers, especially the government and legislation, in advancing SSCM practices (Govindan, 2018). The institutional theory perspective allows us to comprehend the role of coercive, normative, and mimetic drivers and conformity to these pressures in determining the actions and behaviors organizations.

4.2.3 Stakeholders theory

A stakeholder is ‘‘any group or individual who can affect or is affected by the achievement of an organization’s objectives’’(Freeman, 1984). Stakeholder theory is one of the theories of business ethics and organizational management (Schaltegger, Hörisch and Freeman, 2019). According to stakeholder theory, an organization is regarded as a collection of relationships between people or groups who affect or affected by the operations of the organization (Freeman, 2023). The multiple stakeholders provide resources, impact the business environment, benefit from the organization, and determine its effectiveness (Donaldson and Preston, 1995). Hence, it is impossible for an organization to operate a business model successfully without establishing a good relationship with its stakeholders (Freudenreich, Lüdeke-Freund and Schaltegger, 2020). As per the stakeholder theory, a joint purpose should result from the shared values of an organization and its stakeholders, which subsequently acts as a powerful and inspiring benchmark for collaborative value creation (Breuer and Lüdeke-Freund, 2017). From this point, the involvement of stakeholders and their collective efforts is vital for organizations to create value, and the withdrawal of their support can threaten the viability of the businesses (Haslam et al., 2015; Freeman, 2023).

The concept of externalities is an important notion in the stakeholder theory which is produced by organizations (Sarkis, Zhu and Lai, 2011). These externalities can be classified as negative and positive, and they can have an impact on a firm’s internal and external stakeholders (Govindan, 2018). For example, according to Govindan (2018), pollution is a negative externality which negatively affects the livelihood of a society, and construction of a road is a positive externality which opens new opportunity for commercial development, housing, and tourism. Thus, as a result of the externalities, stakeholders frequently put more pressure on businesses to minimize the adverse impacts and enhance the positive ones (Sarkis, Zhu and Lai, 2011).

Stakeholders are classified into many categories by different authors. Employees, the top management, and stockholders are regarded as internal stakeholders and customers, suppliers, distributors, banks, governments, and NGOs are categorized as external stakeholders (Delmas and Toffel, 2004; Freeman and McVea, 2005). Furthermore, stakeholders can be grouped as direct or indirect, primary or secondary, or based on the attributes they possess such as legitimacy, power or urgency (Mitchell, Agle and Wood, 1997; Delmas, 2001). Various categorization criteria have been used to group stakeholders,

nevertheless, the main idea of stakeholder theory is that internal and external groups will influence organizational practices (Sarkis, Zhu and Lai, 2011; Govindan, 2018).

Furthermore, instead of only concentrating on maximizing its financial success, an organization's primary duty is ensuring its existence and success by balancing the needs of numerous stakeholders (Freeman and McVea, 2005). In this regard, stakeholder theory can help SSCM practices by addressing the environmental, social, and economic dimensions and considering the interest of variety of stakeholders (Govindan, 2018). Hence, taking into account the legitimate interests of stakeholders, businesses need to design their business operations to create value that can address the ecological and social interests of the stakeholders and be an integral part of the business' mission (Casadesus-Masanell and Ricart, 2010; Kurucz et al., 2017). Therefore, stakeholder theory can serve as a guide for leaders of organizations in a supply chain with a more general perspective to understand relations of an organization with the environmental and social systems (Govindan, 2018).

4.3 Conceptual justifications

As discussed in Chapter Two, the adoption of SSCM (SSCM) is fundamentally determined by several critical factors. The critical factors encompass variables such as drivers, enablers, and barriers that positively or negatively influence the adoption of SSCM. It has been contended that the drivers such as the economic and productivity improvement, competitive advantage, social well-being and social responsibility, reputation and brand image enhancement, supportive organizational culture, and adopting an innovative business model which form a bundle of SSCM driving forces, is deemed to give rise to the adoption of SSCM practices. In this study, it represents a set of drivers that lead firms in the Ethiopian coffee industry to embark upon the adoption SSCM practices, which may lead to a set of effects in terms of performance outcomes. Several studies have been undertaken by different researchers to identify and categorize the drivers (Zimon, Tyan and Sroufe, 2020; Guimarães et al., 2022), enablers (Mangla et al., 2018; Vargas, Mantilla and de Sousa Jabbour, 2018; Mastos and Gotzamani, 2022), and barriers (Guimarães et al., 2022; Mohseni, Baghizadeh and Pahl, 2022; Singh et al., 2023) to adopt SSCM. Moreover, to explore the environmental and social sustainability practices (Zailani et al., 2012; Mitra and Datta, 2014; Mani et al., 2016), and the performance outcomes of sustainability practices (Zailani et al., 2012; Ahi and Searcy, 2015a; Sharifi, Fang and Amin, 2023). Hence, this study has an academic significance as the adoption

of SSCM practices has not been investigated with respect to the set of critical factors which includes the drivers, enablers, and barriers, and the performance outcomes of sustainability practices. Considering this academic justification, the theoretical linkage between the critical factors and the implementation of SSCM practices is established, resulting in the development of the first part of the conceptual framework.

In addition, the researcher contends that the implementation of SSCM practices impact the performance outcomes measured in terms of sustainability dimensions. Consequently, it is asserted that the execution of SSCM practices yield performance outcomes assessed in the form of environmental, social, and economic end results. Generally, the adoption of SSCM practices is presumed to have a causal impact on an organization's sustainability performance outcomes, explained in the form of environmental, social, and economic levels (Paulraj, Chen and Blome, 2017; Wang and Dai, 2018; Micheli et al., 2020; Kuwornu et al., 2023). Considering this theoretical justification concerning the causal relationship between the implementation of SSCM practices is supposed to have impact on organizational performance outcomes. Accordingly, the theoretical linkage between the adoption of SSCM practices and the outcomes of sustainability performance themes is created, resulting in the development of the second part of the initial conceptual framework. Hence, considering the theoretical relationship between the three main research themes, the relationship between the set of critical factors, SSCM practices and the performance outcomes, is shown in Figure 4.1.

Figure 4.1: The main research themes of the study

In addition, the researcher supposed that the existence of the critical factors theme which includes drivers, enablers, and barriers will cause the relationship between the implementation of SSCM practices and sustainability performance outcomes themes to fluctuate. Besides, the influence of the critical factors on the adoption of SSCM can create more impact on the relationship between SSCM practices and performance outcomes. Thus,

this study has academic significance, since the research is designed to investigate the impact of the critical factors on the adoption of SSCM while examining the effect of SSCM implementation on the performance outcomes of firms in the context of supply chains in developing countries (Esfahbodi, Zhang and Watson, 2016; Jia et al., 2018).

Furthermore, this section tries to operationalize the main themes of the conceptual framework to craft the initial research model. The first theme of the study has been developed with a bundle of drivers, enablers, and barriers representing the critical factors that determine the adoption of SSCM practices. Hence, the critical factors theme in this research is defined as a set of factors that determine the initiation and implementation of SSCM practices. The factors within the theme critical factors have a positive or negative impact on the implementation of SSCM practices. The first construct is a set of drivers (DRI) which encompasses factors such as economic and productivity improvement (DRI1), competitive advantage (DRI2), social well-being and social responsibility (DRI3), reputation and brand image enhancement (DRI4), supportive organizational culture (DRI5), and adopting an innovative business model (DRI6), give rise the adoption of SSCM practices. The drivers (DRI) construct includes factors that lead organizations within the supply chain to embark upon SSCM practices adoption. The second construct is bundle of enablers (ENA) which includes cost effectiveness and improvements in overall performance (ENA1), joint efforts, planning and capacity building (ENA2), understanding customer and stakeholder requirements (ENA3), monitoring and auditing the ongoing supply chain activities (ENA4), understanding the sustainability initiative's importance and benefits (ENA5), and resources allocation and information sharing within and across organizations (ENA6), facilitate the implementation of SSCM initiatives. All the factors within the enablers (ENA) construct foster an organization to implement SSCM initiatives successfully. Therefore, the enablers (ENA) construct is postulated to have a positive direct relationship with the adoption of SSCM practices. The third construct is developed from a set of barriers (BAR) which comprises difficulty in mindset and cultural changes (BAR1), lack of proper technology and infrastructure (BAR2), lack of top and middle management support (BAR3), lack of government support (BAR4), high financial costs and lack of resources (BAR5), and communication gaps and inadequate collaboration between parties (BAR6), inhibit the implementation of SSCM practices. The factors in the barriers (BAR) construct impede an organization from successfully implementing SSCM initiatives. Hence, the barriers (BAR) construct is proposed to have a

negative direct relationship with the adoption of SSCM practices. The list of drivers, enablers and barriers together with their respective code is presented in Table 4.2.

Table 4.2: List of drivers, enablers and barriers

S.N	Drivers	Enablers	Barriers
1	Economic and productivity improvement (DRI1)	Cost effectiveness and improvements in overall performance (ENA1)	Difficulty in mindset and cultural changes (BAR1)
2	Competitive advantage (DRI2)	Joint efforts, planning and capacity building (ENA2)	Lack of proper technology and infrastructure (BAR2)
3	Social well-being and social responsibility (DRI3)	Understanding customer and stakeholder requirements (ENA3)	Lack of top and middle management support (BAR3)
4	Reputation and brand image enhancement (DRI4)	Monitoring and auditing the ongoing supply chain activities (ENA4)	Lack of government support (BAR4)
5	Supportive organizational culture (DRI5)	Understanding the sustainability initiative's importance and benefits (ENA5)	High financial costs and lack of resources (BAR5)
6	Adopting an innovative business model (DRI6)	Resources allocation and information sharing within and across organizations (ENA6)	Communication gaps and inadequate collaboration between parties (BAR6)

Source: author's own work

The second theme of the research is concerned with the SSCM practices which include the main sustainability dimensions called the environmental sustainability practices and social sustainability practices. The two constructs of environmental sustainability practices (ESP) and social sustainability practices (SSP) embody the major activities and processes involved within the SSCM, serving as representatives of SSCM practices. Environmental sustainability practices (ESP) construct comprises tasks such as sustainable process design (ESP1), minimization of waste (ESP2), improvements of packaging (ESP3), environmentally responsible purchasing (ESP4), green and reverse logistics (ESP5), customer sustainability information (ESP6), and environmental certification (ESP7). The environmental sustainability practices are expected to provide sustainability performance outcomes explained in terms of environmental, social and economic end results. Besides, the social sustainability practices (SSP) construct covers activities for instance, human rights (SSP1), safety and health (SSP2), equality and ethics (SSP3), philanthropy and social welfare (SSP4), socially responsible purchasing (SSP5), and employee welfare (SSP6). Similarly, social sustainability practices are expected to provide sustainability performance and the end results manifested in terms of

environmental, social and economic outcomes. Both the environmental and social sustainability practices constructs represent the core theme of SSCM practices, and they are the focus of the conceptual framework. Table 4.3 presents the list of environmental and social sustainability practices and their corresponding identification codes.

Table 4.3: List of environmental and social sustainability practices

S.N	Environmental sustainability practices	Social sustainability practices
1	Sustainable process design (ESP1)	Human rights (SSP1)
2	Minimization of waste (ESP2)	Safety and health (SSP2)
3	Improvements of packaging (ESP3)	Equality and ethics (SSP3)
4	Environmentally responsible purchasing (ESP4)	Philanthropy and social welfare (SSP4)
5	Green and reverse logistics (ESP5)	Socially responsible purchasing (SSP5)
6	Customer sustainability information (ESP6)	Employee welfare (SSP6)
7	Environmental certification (ESP7).	

Source: author's own work

The third theme of the study deals with the performance outcomes of the implementation of environmental and social sustainability practices measured in terms of environmental, social, economic and indicators. The two main dimensions of sustainability are evaluated with environmental performance and social performance, and economic performance that represent the performance outcomes of SSCM implementation. For the purpose of the study, the researcher defined environmental performance, social performance, and economic performance as a set of performance outcomes construct which describe the consequences of the implementation of SSCM practices. Hence, the three performance indicator constructs are considered as the end results of the research model and placed in the conceptual framework on antecedents and outcome effects. The environmental performance indicators cover reduction in solid and water waste (OSP1), reduction of environmental accidents (OSP2), and decrease in consumption of hazardous toxic materials (OSP3). The social sustainability performance measures include improvement of company images (OSP4), enhancement of corporate images as an ethical organization (OSP5), and improved employee or community health and safety (OSP6). The economic performance outcomes comprise an increase in sales of products (OSP7), reduction in costs of processing and distribution (OSP8), and increase in organizational profit and profit margins (OSP9). The list of performance indicators used to measure the outcomes of sustainability practices, and their code is depicted in Table 4.4.

Table 4.4: List of outcomes of sustainability practices

S.N	Environmental performance	Social performance	Economic performance
1	Reduction in solid and water waste (OSP1)	Improvement of company images (OSP4)	Increase in sales of products (OSP7)
2	Reduction of environmental accidents (OSP2),	Enhancement of corporate images as an ethical organization (OSP5)	Reduction in costs of processing and distribution (OSP8)
3	Decrease in consumption of hazardous toxic materials (OSP3)	improved employee or community health and safety (OSP6)	Increase in organizational profit and profit margins (OSP9)

Source: author's own work

As a result, considering the conceptual and theoretical justifications, the researcher has developed the comprehensive critical factors, SSCM practices, and performance outcomes initial conceptual framework of the study as shown in Figure 4.2. The comprehensive nature of the research model is in line with the research objectives of the study to develop an integrated and holistic perspectives required for the inclusion of the influential effects of the critical factors to investigate the impact of SSCM practices adoption on performance outcomes.

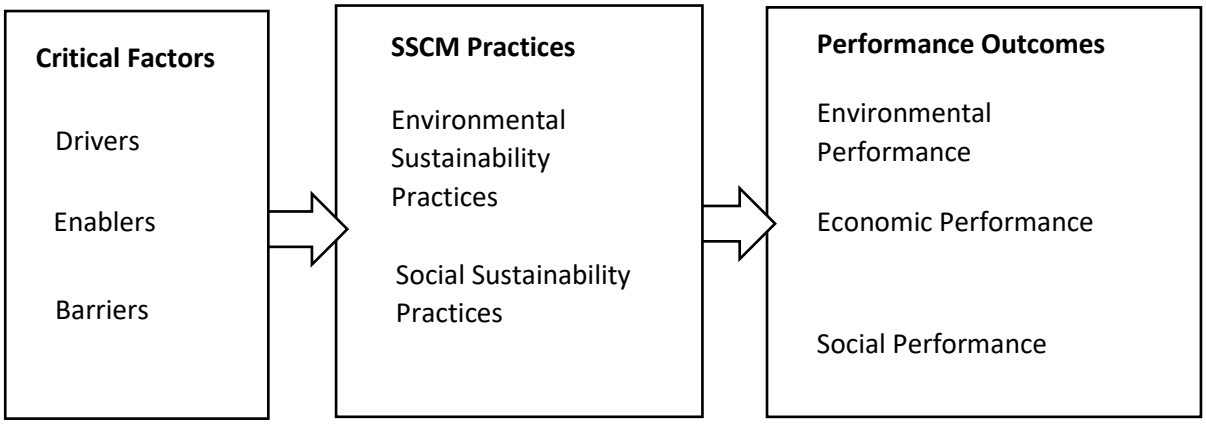


Figure 4.2: Initial conceptual framework model

In general, the initial conceptual framework model is developed considering organizational and SCM theories and conceptual justifications regarding organizational performance and the cause-and-effect reasoning. In addition, the comprehensive and integrated perspective of the research framework enables the study to effectively analyze the impact of the adoption of SSCM practices on the sustainability performance outcomes considering the influence of the critical factors.

4.4 Hypothesis development

This section develops the hypothesis concerning the relationship between the constructs of the research using the theoretical and conceptual foundations discussed pertaining to the critical factors, SSCM practices and sustainability performance outcome themes and empirical findings from the relevant literature in study area. Accordingly, this section presents eight hypotheses of the study proposed subject to further empirical investigation.

4.4.1 Relationship between critical factors and SSCM practices

The critical factors theme of this study covers the drivers, enablers, and barriers that determine the adoption of SSCM practices. To effectively integrate sustainability initiatives into supply chains, it is important to capitalize on the necessary drivers while concurrently overcoming major obstacles (Mubarik and Khan, 2024) and take the advantage of the enablers to facilitate the implementation. The specific impact of the drivers, enablers, and barriers and the relationship they have with the SSCM practices is discussed in the following subsections.

4.4.1.1 Drivers and SSCM practices

It has been widely accepted that driving forces exerted from internal and external stakeholders exert pressure on organizations in supply chains to adopt SSCM initiatives. As per Caniato et al. (2012) drivers of SSCM can be defined as pressures that force organizations toward the adoption of sustainability initiatives. Moreover, as per Saeed, Waseek and Kersten (2017) drivers for SSCM are defined as motivators or influencers that encourage or push organizations to execute sustainability initiatives in their supply chain. In this regard, the researcher believed that organizations embark upon undertaking sustainability initiatives along their supply chain to address the pressure that emanate from driving forces. The literature has identified several potential drivers that influence organizations to adopt SSCM practice. For this study the researcher has identified six main drivers. The drivers are economic and productivity improvement (Zimon, Tyan and Sroufe, 2020; Adams, Donovan and Topple, 2023), competitive advantage (Saeed and Kersten, 2019; Nguyen et al., 2023), social well-being and social responsibility (Govindan, 2018; Ouro-Salim and Guarnieri, 2023), reputation and brand image enhancement (Golini et al., 2017; Mohseni, Baghizadeh and Pahl, 2022), supportive organizational culture (Jia et al., 2018; Mehmood et al., 2021), and adopting an innovative business model (Luthra et al., 2020; Guimarães et al., 2022). As per Zimon, Tyan

and Sroufe (2020), drivers are triggers to start the implementation of SSCM initiatives, which provide motivational factors for organizations in a supply chain to adopt SSCM practices. Thus, the drivers (DRI) construct is assumed to have a positive direct relationship with the adoption of SSCM practices in general and specifically with the environmental sustainability practices (ESP) and social sustainability practices (SSP).

H1. Drivers of SSCM are directly and positively related with environmental sustainability practices.

H2. Drivers of SSCM are directly and positively related with social sustainability practices.

4.4.1.2 Enablers and SSCM practices

Menon and Ravi (2021b), described the term enabler as 'to give power, to make, ability or competence'. Moreover, enablers are defined as factors that aid or assist an organization in the adoption of SSCM (Sancha, Longoni and Giménez, 2015). Therefore, for this study enablers are designated as a set of factors which facilitate or assist the adoption of environmental and social sustainability practices. In the literature several enablers are elucidated by many researchers in several industries with different perspectives. For the purpose of this research the construct enablers (ENA) comprises cost effectiveness and improvements in overall performance (Luthra et al., 2020; Elhidaoui and Kota, 2023), joint efforts, planning and capacity building (Elhidaoui and Kota, 2023; Hidayati, Garnevska and Childerhouse, 2023), understanding customer and stakeholder requirements (Mangla et al., 2018; Mani and Gunasekaran, 2018), monitoring and auditing the ongoing supply chain activities (Mangla et al., 2018; Elhidaoui and Kota, 2023), understanding the sustainability initiative's importance and benefits (Akhtar et al., 2016; Elhidaoui and Kota, 2023), and resources allocation and information sharing within and across organizations (Mangla et al., 2018; Mastos and Gotzamani, 2022). All the factors within the enablers (ENA) construct aid an organization to the shift towards sustainability and facilitate the successful implementation of SSCM initiatives. Therefore, the enablers (ENA) construct is postulated to have a positive direct relationship with the adoption of SSCM practices.

H3. Enablers of SSCM are directly and positively related with environmental sustainability practices.

H4. Enablers of SSCM are directly and positively related with social sustainability practices.

4.4.1.3 Barriers and SSCM practices

The integration of sustainability initiatives into supply chains is not an easy undertaking. Generally, organizations often face many barriers and challenges when implementing SSCM practices (Gupta, Kusi-Sarpong and Rezaei, 2020). According to Menon and Ravi (2021a), barrier is defined as a factor which is hurdle that prevents access of sustainability in supply chain perspective. Hence, barriers hinder a company's endeavor in adopting sustainable practices. For this research, barriers are described as a bundle of factors that obstruct or inhibit organizations from the implementation of SSCM initiatives. From the literature search, the construct barrier encompasses factors such as difficulty in mindset and cultural changes (Adams, Donovan and Topple, 2023; Ouro-Salim and Guarnieri, 2023), lack of proper technology and infrastructure (Ghadge et al., 2021; Mehmood et al., 2021), lack of top and middle management support (Mastos and Gotzamani, 2022; Mohseni, Baghizadeh and Pahl, 2022), lack of government support (Agyemang et al., 2018; Govindan, 2018), high financial costs and lack of resources (Elhidaoui and Kota, 2023; Ouro-Salim and Guarnieri, 2023), and communication gaps and inadequate collaboration between parties (Govindan, 2018; Ouro-Salim and Guarnieri, 2023). Each of the factors included in the barriers construct is believed to obstruct the implementation of SSCM initiatives by organizations. Hence, the barriers (BAR) construct is proposed to have a negative direct relationship with the adoption of environmental and social sustainable practices.

H5. Barriers of SSCM are directly and negatively related with environmental sustainability practices.

H6. Barriers of SSCM are directly and negatively related with social sustainability practices.

4.4.2 Relationship between SSCM practices and sustainability performance outcomes

Considering critical factors that determine the adoption of SSCM, organizations are implementing environmental and social sustainability practices to obtain sustainability performance outcomes. The two constructs related to the sustainability practices are environmental sustainability practices (ESP) and social sustainability practices (SSP) which serve as a proxy variable for the adoption of SSCM practices. An organizations' SSCM initiatives involve not only environmental sustainability practices but also social sustainability in organizational activities (Seuring and Müller, 2008). The performance outcomes of the adoption of SSCM practices, consequently, include not only the economic but also the

operational, environmental and social parameters of the supply chain performance (Baliga, Raut and Kamble, 2019). For this study the performance outcomes of sustainable practices cover environmental, social, economic measures. The environmental performance indicators include reduction in solid and water waste (Hanim et al., 2012; Mitra and Datta, 2014), reduction of environmental accidents (Ahi and Searcy, 2015a; Baliga, Raut and Kamble, 2019), decrease in consumption of hazardous toxic materials (Hanim et al., 2012; Ahi and Searcy, 2015a). The social sustainability performance measures cover improvement of company images (Hoejmose and Adrien-Kirby, 2012; Baliga, Raut and Kamble, 2019), enhancement of corporate images as an ethical organization(Shafiq et al., 2014; Mani et al., 2016), and improved employee or community health and safety (Ahi and Searcy, 2015b; Baliga, Raut and Kamble, 2019). The economic performance outcomes contain increase in sales of products (Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019), reduction in costs of processing and distribution (Rao and Holt, 2005; Hoejmose and Adrien-Kirby, 2012), and increase in organizational profit and profit margins (Rao and Holt, 2005; Mitra and Datta, 2014).

4.4.2.1 Environmental sustainability practices and performance outcomes

Several studies have confirmed that environmental sustainability practices impact the environmental, operational, and financial performance of organizations in supply chains (Mitra and Datta, 2014; Paulraj, Chen and Blome, 2017). For this study, the environmental sustainability practices (ESP) construct encompasses the observable practices such as sustainable process design (Rao, 2004; Mitra and Datta, 2014), minimization of waste (Rao and Holt, 2005; Baliga, Raut and Kamble, 2019), improvements of packaging (Zailani et al., 2012; García-Arca, Prado-Prado and Garrido, 2014), environmentally responsible purchasing (Vachon and Klassen, 2006; Baliga, Raut and Kamble, 2019), green and reverse logistics (García-Arca, Prado-Prado and Garrido, 2014; Mitra and Datta, 2014), customer sustainability information (Vachon and Klassen, 2006; Baliga, Raut and Kamble, 2019), and environmental certification (Hoejmose and Adrien-Kirby, 2012; Baliga, Raut and Kamble, 2019). Environmental sustainability practices in supply chains leads to a reduction in usage of raw materials, reduction in waste emissions, improvement in logistics processes, which should logically result into an improvement in environmental and operational performance (Baliga, Raut and Kamble, 2019). Hence, the researcher supposed that environmental sustainability practices have a positive direct relationship with performance outcomes of sustainability.

H7. Environmental sustainability practices are directly and positively related with performance outcomes of sustainability.

4.4.2.2 Social sustainability practices and performance outcomes

Social sustainability practices have enabled organizations to achieve social legitimacy, steering to an improved business environment and better financial performance (Wang and Sarkis, 2017). Moreover, Wu et al. (2015) confirmed that organizations which implement social sustainability practices enable them to establish a good relationship with stakeholders such as employees, customers, business partners and the community, thereby to enhance the firms' social reputation and financial performance. Besides, Saeidi et al. (2015) implied that corporate social responsibility practices indirectly boost firm performance by enhancing the reputation and competitive advantage, consequently improving customer satisfaction. For the purpose of this study the social sustainability practices (SSP) construct comprise activities like human rights (Shafiq et al., 2014; Mani et al., 2016), safety and health (Longo, Mura and Bonoli, 2005; Ahi and Searcy, 2015b), equality and ethics (Shafiq et al., 2014; Mani et al., 2016), philanthropy and social welfare (Shafiq et al., 2014; Baliga, Raut and Kamble, 2019), socially responsible purchasing (Mani et al., 2016; Baliga, Raut and Kamble, 2019), and employee welfare (Longo, Mura and Bonoli, 2005; Ahi and Searcy, 2015b). Hence, the researcher contended that social sustainability practices have a positive direct impact on sustainability performance outcomes of an organization.

H8. Social sustainability practices are directly and positively related with performance outcomes of sustainability.

4.5 The Conceptual framework of the study

The conceptual framework of the study is crafted based on the theoretical underpinnings and the proposed eight research hypotheses. The development of a comprehensive conceptual framework enables the study to attain the main objectives of study. The proposed conceptual model put together the impact of critical factors on the adoption of SSCM initiatives, implementation of SSCM practices, and corresponding performance outcomes. Hence, this research is expected to integrate the proposed hypotheses into the conceptual framework, and to create individual theoretical associations between the constructs of the study to posit the final framework. Consequently, through the establishment of relationships between the six constructs of the study, the critical factors, SSCM practices, and performance outcomes

conceptual framework is developed. The theoretical framework that guides this study is shown in Figure 4.3.

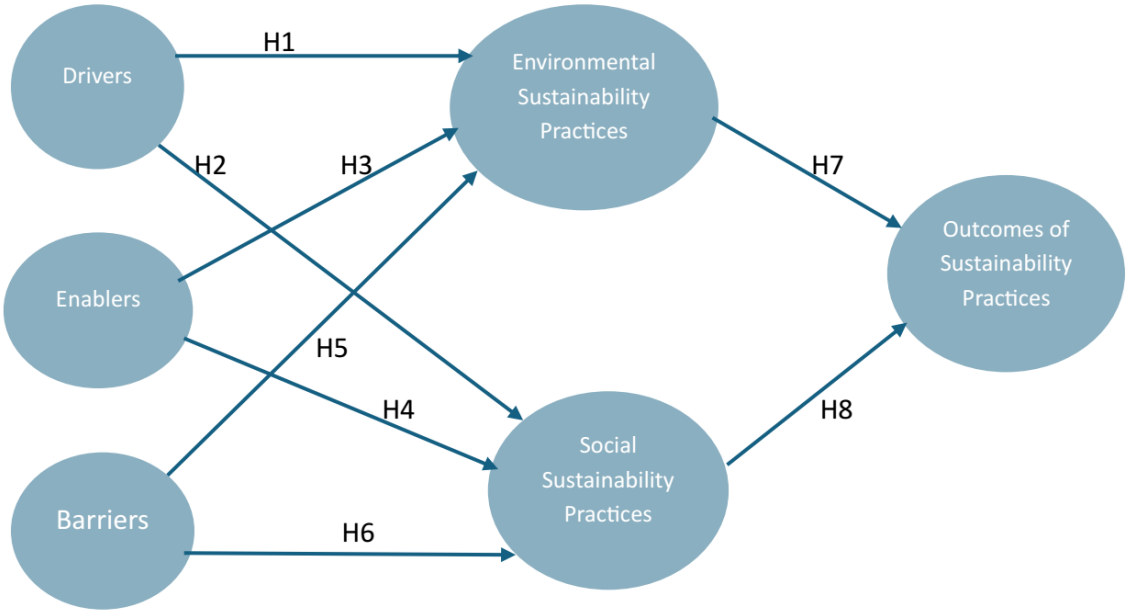


Figure 4.3: Proposed conceptual framework of the study

The conceptual framework of the study is a path analytical model which includes six constructs, drivers (DRI), enablers (ENA), barriers (BAR), environmental sustainability practices (ESP), social sustainability practices (SSP), and outcomes of sustainability practices (OSP). The environmental and social sustainability dimensions of the SSCM practices are the focal constructs of the conceptual framework, the drivers, enablers, and barriers as antecedents and the performance outcomes as consequences.

The basic idea is that the adoption of SSCM practices is guided by the drivers, enablers, and barriers that determine the adoption of SSCM practices which lead to improved environmental, social and economic performance. Therefore, it is contended that the drivers, enablers, and barriers constructs have direct connection with the central constructs of environmental and social SSCM practices and these focal SSCM practices constructs also have causal relationships with the performance outcomes constructs. Changes made on the drivers, enablers, and barriers collectively will impact the ability of organizations to implement the SSCM practices, thereby will have an effect on performance outcomes.

In a nutshell, this study has developed a comprehensive conceptual framework that integrates the drivers, enablers, and barriers of SSCM initiatives, the environmental and social sustainability practices, and the performance outcomes of SSCM practices. Hence, this

research is expected to contribute to the existing SSCM literature by crafting a comprehensive conceptual model that can evaluate the effects of SSCM practice implementation on performance outcomes while taking into account the influence the critical factors to adopt SSCM practices. By combining the three primary SSCM research clusters into a single and comprehensive model, the proposed conceptual framework is a novel in SSCM field of study to examine the research phenomena from an integrated and holistic viewpoint. Furthermore, this study is believed to create an understanding on how the interplay between drivers, enablers, and barriers determine the adoption of an SSCM initiatives, which can be used as a strategy for the successful implementation of SSCM practices determined by the critical factors.

4.6 Procedure to validate the conceptual framework

4.6.1 Data type of the research

According to Saunders, Lewis and Thornhill (2023), for most business and management studies, researchers need to collect data using questionnaires to be used for either descriptive or explanatory purposes. The type of data required to validate the proposed hypotheses and carry out empirical examination for this study are specifically concerned with the drivers, enablers, and barriers to adopt SSCM initiatives, the environmental and social sustainability practices, and SSCM performance outcomes. However,there is little existing information and data on SSCM research, the field of study is still in the early stages of development specially from supply chain developing countries perspectives (Esfahbodi, Zhang and Watson, 2016; Jia et al., 2018). Additionally, in empirical research the researcher often collects data directly from respondents for a specific topic (Saunders et al., 2009). The process by which the researcher personally obtains original primary data using a variety of techniques, including questionnaires, interviews, and direct observation, is often known as primary data collection (Bryman, 2016). Generally, when the objectives of a research are difficult to be achieved utilizing secondary data, the researcher must collect primary data (Hair, Page and Brunsveld, 2020). Hence, to address the research questions and accomplish the objectives of this study, primary data is needed to be collected from managers with the knowledge of SSCM from organizations in the Ethiopian coffee industry.

4.6.2 Research ethics and ethical acts

As per Saunders, Lewis and Thornhill (2023), research ethics are the norms of conduct for researchers that dictate how they should behave with regard to the rights of the study subjects and those impacted by it. The ethical principles in business research include avoidance of harm, informed consent, protect privacy, and preventing deception (Bell, Bryman and Harley, 2022). As a result, the researcher has applied the main ethical principles of voluntary participation, the requirement of informed consent, minimizing risk of harm for participants, confidentiality of the information provided by respondents, and ensure that participants will remain anonymous throughout the study. Moreover, to make sure that the researcher has respected the research ethics principles, an ethical review application was completed and submitted to Liverpool John Moores University's Research Ethics and Governance together with a sample of the questionnaire and ethical approval was given with reference number 22/MME/001.

4.7 Population and unit of analysis of the study

4.7.1 Population of the study

In essence, Hair, Page and Brunsveld (2020) described population as the total of all the elements that possess a common set of characteristics. Moreover, population refers to the full set of cases or elements from which a sample is drawn, whereas, target population is often a subset of the population and it is the actual focus or target of the research (Saunders, Lewis and Thornhill, 2023). Figure 4.4 illustrates the population, target population, and individual cases or element of a study. This research intends to study the impact of critical factors that determine the adoption of SSCM initiatives and the effect of implementing SSCM practices on the performance outcomes of Ethiopian coffee producing and exporting firms. Hence, in order to obtain the required information to achieve the research objectives and address the research questions, the study has considered coffee producing and exporting in the Ethiopian coffee industry. Consequently, the target population of the study is set of firms that are involved in the coffee producing and exporting in the Ethiopian coffee supply chain.

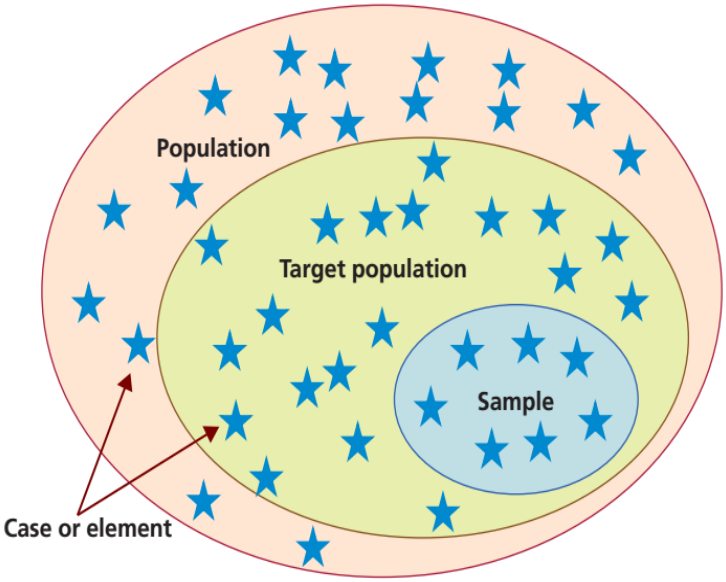


Figure 4.4: Population, target population, and individual cases
Source: Saunders, Lewis and Thornhill (2023, p.292)

The researcher used the Ethiopian Coffee Association (ECA) members directory to identify the target population of this research. ECA was founded in 1969 by major Ethiopian coffee exporters as a non-profit making and major promoter of Ethiopian Coffee in the international market, more information about the association can be obtained from its website https://ethiopiancoffeeassociation.org. The researcher had access to the members' data through the permission of the government regulatory agency called Ethiopian Coffee and Tea Authority, for more information refer https://ethiocta.gov.et. The association has 511 members involved in growing, roasting and exporting coffee in the Ethiopian coffee industry. Since the size of the members of the association is manageable, the researcher has considered all 511 members as the target population of the study.

4.7.2 Unit of analysis and key respondents

The unit of analysis is the principal element of a research project. In other words, it is the "who" or "what" of the study that the researcher want to understand and explain (Hair, Page and Brunsveld, 2020). The unit of analysis in operations and supply chain management research predominantly focusses on people, businesses, plants, teams, systems, and projects (Flynn et al., 2003). Generally, the unit of analysis for a study is defined in reference with the research question (Bell, Bryman and Harley, 2022). Therefore, the unit of analysis for this study is determined to be coffee producing and exporting firms in the Ethiopian coffee industry with managers as key respondents. The unit of analysis is defined considering the

proposed research questions of the study which intends to examine the impact of critical factors on the adoption of SSCM initiatives, and effect of SSCM implementation on the performance of coffee producing and exporting firms. According to Malhotra and Grover (1998), individuals surveyed as key informants could be representatives of the themselves, their project, their expertise, or their organization. For this study, the key respondents who represent their firms include top and middle level managers with job positions of general manager, plant manager, supply chain manager, logistics manager, and operations manager. Undertaking a survey on respondents with these job positions is appropriate because the respondents are directly or indirectly engaged in managing the coffee supply chain. Therefore, the researcher believed the respondents were able to provide a knowledgeable response to the proposed research questions in the provided questionnaire.

4.8 Method of data analysis

As per Hair et al. (2021), the choice of data analysis method is determined based on the purpose of the study. The main purpose of this study was to explore the critical factors that determine the adoption of SSCM initiatives, and the corresponding performance outcomes organizations obtained as a result of implementing SSCM practices. To accomplish the purpose of the study, simple descriptive statistics and partial least squares structural equation modeling (PLS-SEM) techniques are used as method of analysis.

4.8.1 Simple descriptive statistics

The first objective of the study is to identify the critical factors that determine the adoption of SSCM initiatives by organizations. Based on in-depth literature review, the research has identified the critical factors that determine the adoption of sustainability initiatives in agrifood supply chains which includes drivers, enablers, and barriers. Since the identified critical factors are many and generally applicable in the agrifood supply chain, it was important to identify the main critical factors from the Ethiopian coffee supply chain perspective. Hence, the next task of the study was to determine the relative importance of critical factors from the perspective of coffee producers and exporters in the Ethiopian coffee industry. To rank the critical factors and identify the relevant key factors it was important to undertake and an empirical survey in the Ethiopian coffee industry. Therefore, a questionnaire was developed by including the drivers, enablers, and barriers identified through the literature review to conduct an empirical survey. The feedback obtained from

coffee producers and exporters using the survey questionnaire was analyzed using simple descriptive statistics and frequency analysis. The results of the survey questionnaire analysis are presented in tables and graphs.

4.8.2 Partial least squares structural equation modeling

A path model is a diagram that is crafted to visualize the hypotheses and variable relationships and then explore those hypotheses and associations by applying the SEM technique (Hair, Page and Brunsveld, 2020). The PLS path model can be explained from the viewpoint of two models, namely, the structural model also called the inner model and the measurement model also known as the outer model (Tenenhaus et al., 2005; Diamantopoulos, 2006). This implies that a structural model and a measurement model together construct a complete PLS path model also known as PLS SEM model. An example of a PLS path model is shown in Figure 4.5.

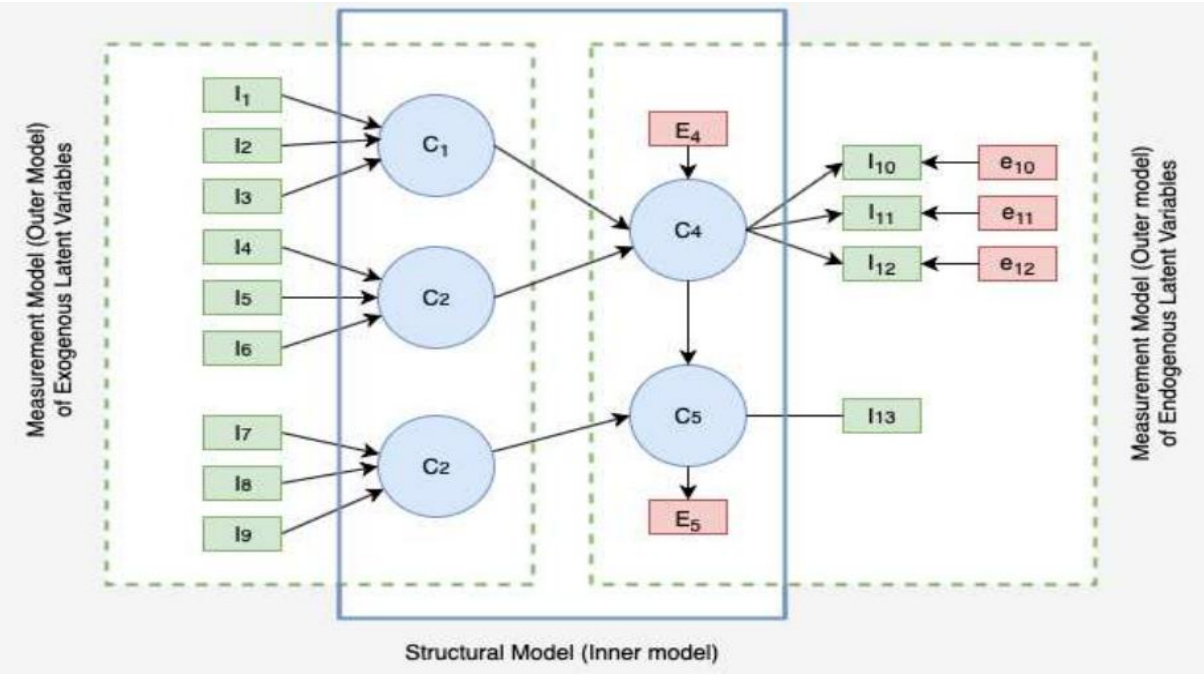


Figure 4.5: PLS path model example
Source: Hair et al. (2021)

The structural model presents constructs and relationships between constructs. Constructs are variables that are not directly measured and represented as circles or ovals in the structural model e.g. in Figure 4.5, C_1 to C_5 are constructs. The relationships between constructs are displayed as arrows in the path model. Whereas the measurement model includes indicator variables and relationships between indicator variables and constructs. Indicator variables are directly measured proxy variables which are also called items, or

manifest or variables. Indicator variables contain the raw data and are represented as rectangles in the path model e.g. in Figure 4.5, I_1, to I_{13} are indicator variables. The relationships between constructs in the structural model and indicator variables in the measurement model are also shown as arrows in the path model. It is also noted that there are two types of measurement model based on the latent (unobservable) variables. If the latent variables, i.e. the constructs which explain other constructs in the model, then it is called the measurement model of exogenous latent variables e.g. in Figure 4.5, left dashed rectangle represents measurement model of exogenous constructs. On the other hand, if constructs are explained by other constructs in the model, then it is called the measurement model of endogenous latent variables e.g. in Figure 4.5, the right dashed rectangle represents the measurement model of endogenous constructs.

There are also error terms in the path models which are connected to the endogenous latent variables (constructs) and the reflectively measured indicator variables. When a path model is estimated, in that case, the unexplained variance is represented by the error terms. On the other hand, exogenous latent variables (constructs) and formatively measured variables do not have error terms. For example, in Figure 4.5, e_{10} to e_{12} are the error terms for the reflectively measured indicators I_{10} to I_{12} respectively. However, C_5 is a single-item construct, so there is no error term connected to I_{13}. Moreover, E_4 and E_5 are the error terms for endogenous latent variables C_4 and C_5 respectively, which are labelled differently than the error terms connected to the reflectively measured indicators.

Finally, a theory is required to develop path models, where theory is referred to as a set of related hypotheses. Hypotheses are individual conjectures that are systematically developed and logically linked together and can be tested empirically to explain and predict outcomes. To develop a PLS path model, two types of theory are required, one is structural theory, and another one is measurement theory. Structural theory shows how the latent variables (constructs) are related to each other in the structural model. The position and sequence of the constructs in the structural model are determined by the theory or the experiences and knowledge of researchers. In the path models, the sequence of constructs is placed from left to right. Any construct which is at the starting (left side) of a sequence is called an independent variable also called an exogenous latent variable, for example in Figure 4.5, C_1, C_2, and C_3 are independent variables. The construct at the end of a sequence is called a dependent variable, also called an endogenous latent variable, for example in Figure 4.5, C_4

and C_5; are dependent variables. It is to note that if any construct which is in the middle of a sequence or which serves as both an independent and dependent variable is also called an endogenous latent variable. In a nutshell, the construct on the left (independent variable) of a sequence is preceding and predicting the construct in the right (dependent variable) of the sequence. It is important to mention that, as the independent variables explain the dependent variables in the path model, they do not have error terms. Measurement theory specifies how the constructs in the structural model are measured, which can be done in two ways mainly, one is a formative measurement model, and another one is a reflective measurement model. It is vital to choose a suitable approach for modeling a construct in developing the path model which needs to be taken cautiously based on the particular research study.

4.8.2.1 Evaluation of measurement model

Evaluating measurement models entails assessing the reliability of measures from both an indicator reliability and construct reliability perspectives. The average variance extracted (AVE) is used in the validity evaluation process to determine each measure's convergent validity. In addition, the heterotrait–monotrait (HTMT) ratio of correlations enables the evaluation of the discriminant validity of a reflectively assessed construct relative to other construct measures within the same model. Each of the evaluation criteria for measurement models is discussed in detail in the following sections, along with some general guidelines. The measurement model evaluation process is shown in Figure 4.6.

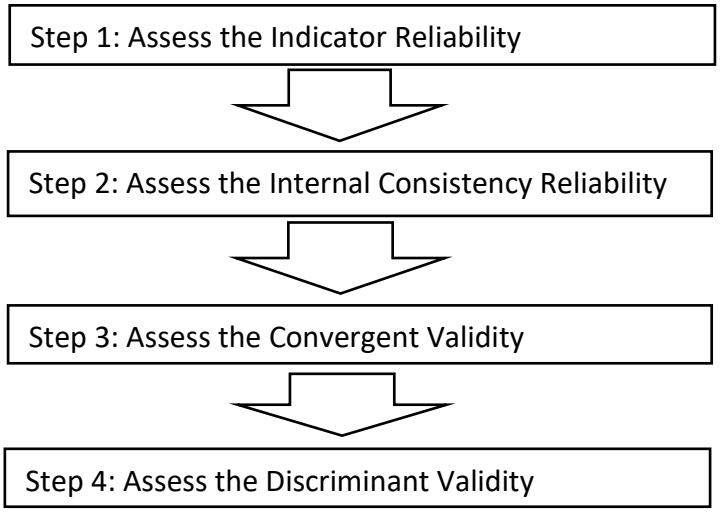


Figure 4.6: Measurement model evaluation procedure
Source: Hair et al. (2021).

1. Assessment of indicator reliability

The initial step in measurement model evaluation is concerned with examining how much of each indicator's variance is explained by its construct which is an indicator of indicator reliability. To determine the explained variance of an indicator, we have to square the indicator loading, which is the bivariate correlation between indicator and construct (Hair et al., 2021). It is advised to use indicator loadings greater than 0.708 since they show that the construct explains for more than 50% of the variance in the indicator, demonstrating appropriate indicator reliability. However, in social science studies, researchers often find that their measurement models have weaker indicator loadings which are less than 0.708, particularly when they use newly designed scales (Hulland, 1999). When an indicator's loading is less than 0.70, researchers should carefully consider how removing an indicator would affect other reliability and validity measures rather than automatically discarding the indicator. In general, indicators having loadings between 0.40 and 0.708 ought to be removed only in cases when doing so raises the recommended threshold value for either convergent validity or internal consistency reliability (Hair et al., 2021). A further factor to consider when deciding whether to remove an indication is how doing so will impact content validity, which is the degree to which a measure accurately captures all aspects of a particular construct. Consequently, indicators that have lower loadings are occasionally kept. Nonetheless, indicators with extremely low loadings that are below 0.40 should be removed from the measurement model at all times (Hair et al., 2022a).

2. Internal consistency reliability

The second step in measurement model evaluation is related to the examination of internal consistency reliability. Internal consistency reliability is known as the degree to which indicators measuring the same construct are related with each other. One of the primary and essential measurement techniques applied to measure internal consistency reliability in PLS-SEM is composite reliability, $rho_{C,}$ proposed by Jöreskog (1971). Generally, higher composite reliability values indicate a higher degree of reliability. According to Hair et al. (2021), the composite reliability values between 0.60 and 0.70 are considered “acceptable in exploratory research,” whereas values between 0.70 and 0.90 range from “satisfactory to good.” Whereas values above 0.95 are problematic, because they reveal that the indicators are redundant, consequently decreasing the construct validity (Diamantopoulos et al., 2012). Composite reliability values of 0.95 and higher may indicate the possibility of undesirable response

patterns of respondents, such as straight lining, which could lead to exaggerated correlations among the error terms of the indicators.

Moreover, Cronbach's alpha is another internal consistency reliability metric that uses the same thresholds as composite reliability. A main weakness of Cronbach's alpha, however, is that it assumes all indicator loadings are the same in the population also referred to as tau-equivalence (Hair et al., 2021). Nonetheless, researchers have demonstrated that Cronbach's alpha is a suitable lower-bound estimate of the true internal consistency reliability even in the absence of tau-equivalence (Trizano-Hermosilla and Alvarado, 2016). The composite reliability roh_C may be too liberal while the Cronbach's alpha is rather a conservative measure, therefore, the construct's real reliability is typically viewed as within these two extreme values (Hair et al., 2021). As a result, some researchers have proposed the exact or consistent reliability coefficient rho_A (Dijkstra, 2014; Dijkstra and Henseler, 2015). Since the reliability coefficient rho_A usually lies between the liberal composite reliability and the conservative Cronbach's alpha, it is seen as an acceptable compromise between the two metrics of internal consistency reliability (Hair et al., 2021).

3. Convergent validity

The third step in measurement model assessment is to assess the convergent validity of each construct. Convergent validity measures the extent to which the construct converges to explain the variance of its indicators (Hair et al., 2021). Average Variance Extracted (AVE) for all indicators on each construct is used as a measurement to evaluate a construct's convergent validity. The AVE can be defined as the grand mean value of the squared loadings of the indicators associated with the construct, that is the total of the squared loadings divided by the number of indicators (Hair et al., 2021). Consequently, the AVE can be assumed to be the same as the communality of a construct. The minimum acceptable value of AVE is 0.50, therefore, an AVE of 0.50 or more indicates that the construct explains 50 percent or higher of the indicators' variance that make up the construct (Hair et al., 2022a).

4. Discriminant validity

Finally, the fourth step measurement model evaluation is to assess discriminant validity. According to Hair et al. (2021), discriminant validity can be described as a measurement technique that computes the degree to which a construct is clearly distinguishable from other constructs in the structural model based on empirical evidence. The conventional metric was proposed by Fornell and Larcker (1981), who proposed that the squared variance within each

construct, AVE, should be compared to the squared inter-construct correlation of that construct and all other reflectively measured constructs in the structural model- as a measure of shared variance between constructs and that the shared variance between all model constructs should not exceed their AVEs. However, recent studies indicate that this measurement technique is not suitable for discriminant validity measurement. For instance, Henseler, Ringle and Sarstedt (2015), demonstrate that the Fornell–Larcker criterion is not very effective, especially when there is only a little difference in the indicator loadings on a construct, i.e., when all the indicator loadings fall between 0.65 and 0.85. In addition, Radomir and Moisescu (2020), have stated that the Fornell-Larcker criterion should be avoided in empirical applications since it frequently fails to accurately reveal discriminant validity flaws. Nonetheless, the Fornell–Larcker criterion is still a commonly applied method, and many researchers are familiar with it.

As a better alternative, Hair et al. (2021) have recommended the application of the heterotrait–monotrait ratio (HTMT) of correlations to assess discriminant validity in PLS-SEM. Heterotrait-monotrait, HTMT, correlation is defined as the mean value of the indicator correlations across constructs, as compared to the geometric mean of the average correlations for the indicators measuring the same construct. However, researchers were facing discriminant validity problems when HTMT values are high. Hence, Henseler, Ringle and Sarstedt (2015), proposed a threshold value of 0.90 for structural equation models with constructs that are conceptually very similar to each other. In such a setting, an HTMT value above 0.90 would suggest that discriminant validity is not present. Whereas, when the constructs are conceptually more distinct, a lower and more conservative, threshold value such as 0.85 is recommended (Henseler, Ringle and Sarstedt, 2015).

Moreover, if the HTMT is significantly different from 1.0, bootstrap confidence intervals can be used to test discriminant validity (Henseler, Ringle and Sarstedt, 2015), besides, based on the study context a lower threshold value, such as 0.9 or 0.85 can be defined (Franke and Sarstedt, 2019). To accomplish this, we must determine if the upper bound of the 95% confidence interval is less than 0.90 or 0.85 under the assumption of a significance level of 5% (Hair et al., 2021). As a result, the researcher must consider a 95% one-sided bootstrap confidence interval, the upper border of which is the same as that obtained from calculating a 90% two-sided bootstrap confidence interval. Researchers should generally apply the percentile approach to calculate the bootstrap confidence intervals, as suggested by Aguirre-

Urreta and Rönkkö (2018). Furthermore, it is recommended that researchers consistently employ 10,000 bootstrap samples (Streukens and Leroi-Werelds, 2016). Table 4.5 summarizes the criteria and rules of thumb to evaluate the measurement model.

Table 4.5: The criteria and rules of thumb to evaluate the measurement model

Criterion	Metrics and thresholds
Reflective indicator loadings	≥ 0.708
Internal consistency reliability	Cronbach's alpha is the lower bound, and the composite reliability rho_C is the upper bound for internal consistency reliability. The reliability coefficient rho_A usually lies between these bounds and may serve as a good representation of a construct's internal consistency reliability Minimum 0.70 (or 0.60 in exploratory research) Maximum of 0.95 to avoid indicator redundancy, which would compromise content validity recommended 0.80 to 0.90.
Convergent validity	AVE ≥ 0.50
Discriminant validity	For conceptually similar constructs, HTMT < 0.90 For conceptually different constructs, HTMT <0.85

Source: Adapted from Hair et al. (2021).

4.8.2.2 Evaluation of the structural model

Once the study has confirmed that the measurement of constructs is reliable and valid, the next step addresses the assessment of the structural model results. The first step is to examine the structural model for possible collinearity issues. The rationale is that the estimation of path coefficients in the structural models is computed based on ordinary least squares (OLS) regressions of each endogenous construct on its corresponding predictor constructs. Like ordinary least squares regression, path coefficients may exhibit bias in the estimate process when there is a large degree of collinearity among predictor constructs. Once the study has ensured that collinearity is not a problem, in the second step, we evaluate the significance and relevance of the structural model relationships that is the path coefficients. In the third step of the procedure, we examine the structural model's explanatory power. The fourth step is concerned with the investigation of predictive power of the structural model. Moreover, in some research situations researchers may undertake the computation and comparison of alternative models, which can emerge from different theories or contexts. PLS-SEM facilitates the comparison of alternative models using established criteria, which are well known from the regression literature. Figure 4.7 presents a systematic procedure to the structural model assessment.

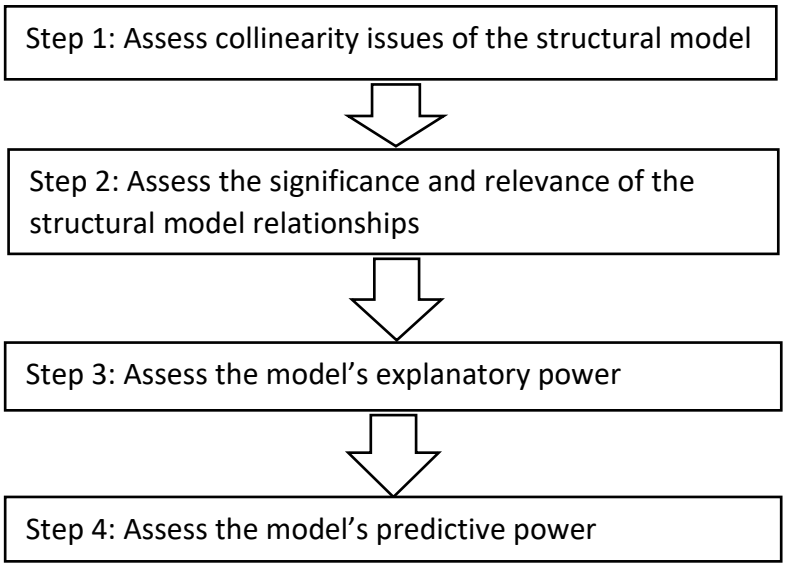


Figure 4.7: Structural model evaluation procedure
Source: Hair et al. (2021).

1. Assessment of collinearity issues of the structural model

As per Hair et al. (2021), the coefficients for the relationships among constructs of a structural model are determined from estimating a series of regression equations. Since each set of predictor constructs has high correlations, the point estimates and standard errors may be biased (Sarstedt et al., 2019b), the structural model regressions should be explored for potential collinearity issues (Hair et al., 2021). In this case, the construct scores of the predictor constructs in each regression in the structural model are used to calculate the variance inflation factor (VIF) values. VIF values above 5 are suggestive of existence of collinearity problems among predictor constructs, however, collinearity problems can also occur at even lower VIF values of 3-5 (Mason and Perreault, 1991; Becker et al., 2015). When collinearity is an issue, creating higher order constructs is often used as a solution (Hair et al., 2019; Sarstedt et al., 2019a).

2. Assessment of the significance and relevance of the structural model relationships

In the second step, the significance of the path coefficients and relevance of the path coefficients are evaluated. The significance assessment employs bootstrapping standard errors to compute path coefficient t-values, or alternatively, confidence intervals (Streukens and Leroi-Werelds, 2016). A path coefficient is considered as significant at the 5% level if the value zero does not fall into the 95% confidence interval (Hair et al., 2021). Usually, when utilizing bootstrapping, the confidence intervals should be constructed using the bias-corrected and accelerated (BCa) method (Aguirre-Urreta and Rönkkö, 2018).

Generally, path coefficients range between -1 and +1; coefficients close to -1 imply strong negative correlations, while those nearer to +1 indicate strong positive relationships (Hair et al., 2021). PLS-SEM analyses standardized data and uses path coefficients to measure the impact of predictor constructs on endogenous constructs. These coefficients represent the changes in the values of the endogenous construct that are associated with standard deviation unit changes in a specific predictor construct, while keeping all other predictor constructs constant. A path coefficient of 0.505, for instance, means that the endogenous construct will grow by 0.505 standard deviation units for every unit increase in the predictor construct. Total effects, which are the total of all indirect effects connecting one construct to another in the model and any direct effects, should also be interpreted by researchers when analyzing the results of structural models. As per Nitzl, Roldan and Cepeda (2016), a more comprehensive understanding of the structural model relationships is obtained by examining the total effects between constructs, including all their indirect effects.

Bootstrapping is a statistical technique that evaluates the variability of a parameter by analyzing the distribution of estimates obtained from resampling from the existing sample data, rather than relying on parametric assumptions to determine the parameter's precision (Davison and Hinkley, 1997). It investigates the stability and importance of various coefficients such as outer weights, outer loading, and path coefficients based on resampling subsamples with replacement from the original sample. The subsamples are drawn randomly from the original data set of the study. The model estimates derived from these subsamples are subsequently employed for standard inference testing, such as the computation of confidence intervals or p-values (Becker et al., 2023).

As a result, PLS-SEM uses a non-parametric bootstrapping process to determine whether coefficients are significant (Davison and Hinkley, 1997). Many subsamples, or bootstrap samples, are randomly selected from the original data sample during PLS-SEM bootstrapping, and each bootstrap sample has the same number of observations as the original sample. In general, it is recommended that researchers should use as many subsamples as possible (Becker et al., 2023). A widely used and recommended number for the bootstrap samples in the literature is 5000, however, Sarstedt, Hair Jr and Ringle (2023) have suggested to use 10,000 bootstrap samples considering the more recent recommendation by Streukens and Leroi-Werelds (2016).

The other important element in setting the bootstrap is to determine the confidence interval method. There are multiple methods to create confidence intervals using bootstrapping results. Aguirre-Urreta and Rönkkö (2018), have discussed the studentized method, the bias-corrected and accelerated (BCa) approach and the percentile methods. One of the most useful and commonly applied approaches for constructing bootstrap interval is the bias-corrected and accelerated (BCa) bootstrap confidence interval by Efron (1987), which adjusts for biases and skewness in the bootstrap distribution(Hair et al., 2021) . In addition to the bootstrap method, confidence intervals are also considered because it provides additional information on the stability of an estimated coefficient. Commonly used critical values for two-tailed tests are 1.65 (significance level = 10%), 1.96 (significance level = 5%), and 2.57 (significance level = 1%). Critical values for one-tailed tests are 1.28 (significance level = 10%), 1.65 (significance level = 5%), and 2.33 (significance level = 1%)(Hair et al., 2021) . In social science, researchers usually assume a significance level of 5%. In bootstrap procedure when assuming a significance level of 5%, the p value must be smaller than 0.05 to conclude that the relationship under consideration is significant at a 5% level. Accordingly, the confidence interval in the bootstrap allows testing whether a path coefficient is significantly different from zero.

3. Assessment of the model's explanatory power

The third step in structural model evaluation is concerned with the examination of the coefficient of determination (R square) of the endogenous constructs. According to Shmueli and Koppius (2011), the R square is a measure of the explanatory power of the model and the variance explained in each of the endogenous constructs and it is also known as the in-sample predictive power (Rigdon, 2012). The R square ranges from 0 to 1, hence, higher values of the R square indicate a larger explanatory power. Moreover, R square values of 0.75, 0.50, and 0.25 are generally regarded in various social scientific disciplines as substantial, moderate, and weak, respectively (Hair, Ringle and Sarstedt, 2011). However, as per Raithel et al. (2012), acceptable R square levels depend on the research setting, and in some fields like stock return prediction, for instance, R square value as low as 0.10 is deemed sufficient. It is important for researchers to understand that R square is a function of the number of predictor constructs; the more predictor constructs are, the higher the R square value. As a result, the R square should always be understood in the context of the study, considering R square values from comparable studies and models with comparable levels of complexity. When the model

overfits the data, R square values may also be excessively high. When evaluating an intrinsically predictable concept, R square values up to 0.90 may be acceptable such as physical processes. However, similar R square values would probably point to overfitting in a model that forecasts attitudes, perceptions, and intentions in humans (Hair et al., 2019). One of the drawbacks of R square, when additional explanatory variables are added to a model, R square value tends to increase in magnitude. The adjusted R square measure that takes this into account by modifying the R square value according to the number of explanatory factors in relation to the data size and is considered as a more conservative estimate of R square (Hair et al., 2021).

Unfortunately, the adjusted R square does not provide an accurate estimate of the explained variance of an endogenous construct due to the correction factor that was introduced to account for data and model size (Sarstedt et al., 2019b). Researchers can also evaluate the impact of eliminating a particular predictor construct on the R square value of an endogenous construct. The F square effect size is a statistic that has similarity to the size of the path coefficients. More specifically, when comparing the size of the path coefficients and the F square effect sizes, the rank order of the predictor constructs' relevance in explaining a dependent construct in the structural model is frequently the same.

4. Assessment of the model's predictive power

As per Shmueli and Koppius (2011) and Sarstedt and Danks (2022), the R square statistic is often used by many researchers to measure the prediction ability of their models. However, this interpretation is not totally accurate because the R square only reveals the explanatory power of the model within the sample; it does not reveal the predictive power of the model (Chin et al., 2020; Hair and Sarstedt, 2021), also known as out-of-sample predictive power, this metric shows how well a model can predict new or upcoming observations. Therefore, Shmueli et al. (2016), has proposed a PLSpredict to deal with this problem, a procedure for out-of-sample prediction. Researchers can use a variety of prediction statistics, which measure the degree of prediction error in the indicators of a specific endogenous construct, to evaluate a model's predictive power (Hair et al., 2021). The key endogenous construct in the model should be the focus of the prediction error analysis, rather than looking at the prediction errors for each endogenous construct's indicators. The commonly used metric to measure the degree of prediction error is called the root-mean-square error (RMSE). The RMSE measures the square root of the average of the squared discrepancies between the

actual observations and predictions. The other popular measure is known as the mean absolute error (MAE). This measure calculates the average magnitude of errors without considering their direction in a set of predictions. The mean absolute error (MAE) between the expected and observed data is therefore calculated by assigning equal weight to each individual difference. Generally, while analyzing a model's predictive ability, researchers want to look at its RMSE. However, the MAE is a more appropriate prediction statistic (Shmueli et al., 2019), if the prediction error distribution is very nonsymmetric, as indicated by a long left or right tail in the distribution of prediction errors (Danks and Ray, 2018). To interpret the measures, researchers must compare the RMSE or MAE values of each indicator with a naïve linear regression model (LM) benchmark. The LM benchmark values are determined by performing a linear regression of each dependent construct's indicator on the indicators of the exogenous constructs in the PLS path model (Danks and Ray, 2018). Table 4.6 summarizes the criteria and rules of thumb to evaluate the structure model.

Table 4.6: Criteria and rules of thumb to evaluate the structure model

Criterion	Metrics and thresholds
Collinearity	Critical collinearity issues likely occur if VIF ≥ 5 Collinearity issues are usually uncritical if VIF = 3–5 Collinearity is not a problematic issue if VIF < 3
Significance and relevance of the path coefficients	Apply bootstrapping to assess the significance of the path coefficients on the ground of t-values or confidence intervals. Assess the magnitude of path coefficients. Assess the F square values for each path and check that they follow the same rank order as the path coefficient magnitude.
R square value	R square values of 0.75, 0.50, and 0.25 are considered substantial, moderate, and weak. However, R square values must be interpreted in the context of the model and its complexity. Excessive R square values indicate that the model overfits the data.
PLSpredict	Focus on one key target construct in the analysis. Set k = 10, assuming each subgroup meets the minimum required sample size. Use ten repetitions Compare the RMSE (or the MAE) values produced by PLS-SEM with those produced by the LM for each indicator. Check if the PLS-SEM analysis (compared to the LM) yields lower prediction errors in terms of RMSE (or MAE) for all (high predictive power), the majority or the same number (medium predictive power), the minority (low predictive power), or none of the indicators (no predictive power).

Source: Adapted from Hair et al. (2021).

4.9 Chapter summary

Developing a research model and the conceptual framework that guides this study to address the research questions was the main objective of this chapter. In this regard, this chapter has presented the theoretical and conceptual justifications for crafting the conceptual framework and then depicted the initial model, as well as the hypothesis development to propose the theoretical model. This chapter started with theoretical reasoning regarding the conceptual development employing the theoretical underpinnings.

Hence, the theoretical associations between the three primary themes of the research phenomena were constructed, considering the theoretical underpinnings of the integrated themes of the study. As a result, the conceptual framework for the study was crafted with an emphasis on the SSCM practices, considering the determinant critical factors and the corresponding performance outcomes. Next, the initial study model was then created in accordance with our conceptual framework, with cause-and-effect indicators based on theoretical reasoning about organizational performance, the causal rationale, and the theoretical foundations of SCM theory.

Moreover, the study has developed eight distinct research hypotheses for additional empirical tests among the embedded constructs based on the empirical evidence obtained from the relevant literature as well as the theoretical arguments regarding the primary research themes of critical factors that determine the adoption of sustainability, SSCM practices, and SSCM performance. Last but not least, a comprehensive critical factor, SSCM practices, performance outcomes model has been created that can evaluate how SSCM practice adoption affects performance outcomes while taking into account the significant influences of the critical factors to adopt SSCM. These enable this study to accomplish its main objective of developing a comprehensive conceptual model that addresses the research questions of the study.

CHAPTER FIVE: ANALYSIS AND RESULTS

5.1 Overview

This chapter presents the findings of a survey conducted using a questionnaire on the Ethiopian coffee supply chain. The data was collected by the researcher to analyze the practices of SSCM in the Ethiopian coffee industry. Mainly, this chapter will discuss the results of the quantitative analysis using Partial Least Square Structural Equation Modeling to address the objectives of the research. Before addressing the objectives of the research, this chapter discussed the pilot test of the questionnaire, questionnaire administration and response rate, normality assessment of the data collected, and nonresponse bias analysis.

In general, this chapter focuses on the outcomes of the data analysis with the application of appropriate quantitative methods. The data analysis section is divided into three parts. First, the appropriateness of the data collected in terms of validity and reliability is assessed to ensure that the construct validation is acceptable. Secondly, to rank the critical factors and identify the key factors, a simple descriptive analysis is undertaken. Third, PLS-SEM is applied to test the proposed hypotheses regarding the relationship between the study constructs.

5.2 Identification of key critical factors for the study

The study identified the main critical factors that determine the implementation of SSCM initiatives through the in-depth literature review. From these critical factors, eleven are drivers, eight are enablers, and the remaining twelve are barriers. To rank and determine the relative importance of the critical factors an empirical survey was conducted in the Ethiopian coffee industry. A total of 115 respondents from 115 coffee-producing and exporting companies with managerial positions have participated in the survey. Among the surveyed enterprises, 92 (80%) are organized with a private limited company form of business ownership, whereas the remaining 23 (20%) have partnerships, share companies, sole proprietorships, or cooperative forms of ownership. Among the respondents, 36 (31.30%) were logistics managers, 32 (27.83%) were operation managers, 21 (18.26%) were general managers, 20 (17.39%) were supply chain managers, and only six (5.22%) were plant managers. In addition, 66 (57.39%) respondents had one–four years of experience, 39 (33.92%) had 5–9 years, and 10 (8.69%) had 9–12 years of experience in their job positions. Regarding the educational background of the respondents, 71 (61.74%) had a first degree, 42 (36.52%) had a second degree, and only 2 (1.74%) had qualifications below the first degree.

From the profile of the respondents, one can understand that the participants had adequate educational background and work experience to provide sufficient information for the survey.

Based on a literature review, the study has identified 31 critical factors, including drivers, enablers, and barriers. Of these, eleven are drivers that trigger SSCM initiatives in the agrifood supply chain, eight are enablers that facilitate successful implementation, and twelve are barriers that hinder the realization of sustainability initiatives. To understand the relevance and application of these critical factors in Ethiopian coffee supply chains, the researcher has conducted an empirical survey using a questionnaire. As per the feedback obtained from the survey, among the list of drivers, economic and productivity improvement with a mean score of 4.25, competitive advantage with a score of 4.23, social well-being and social responsibility with a score of 4.21, reputation and brand image enhancement with a mean score of 4.17, supportive organizational culture with a score of 4.12, and adopting an innovative business model with a score of 4.04 are the top six and most relevant drivers from the perspective of the Ethiopian coffee supply chain. This result is consistent with the findings of Guimarães et al. (2022) who conducted a similar study on the Brazilian coffee industry. Zimon, Tyan and Sroufe (2020) and Luthra et al. (2020) obtained similar findings in their studies. However, the inclusion of the reputation and brand image enhancement driver among the top-ranking drivers makes this research different from previous studies. Moreover, Guimarães et al. (2022) identified environmental, regional, and international regulations as among the top five drivers; however, in this study, they are found to be the least relevant drivers. The ranking of all drivers to initiate SSCM in the Ethiopian coffee industry is presented in Figure 5.1.

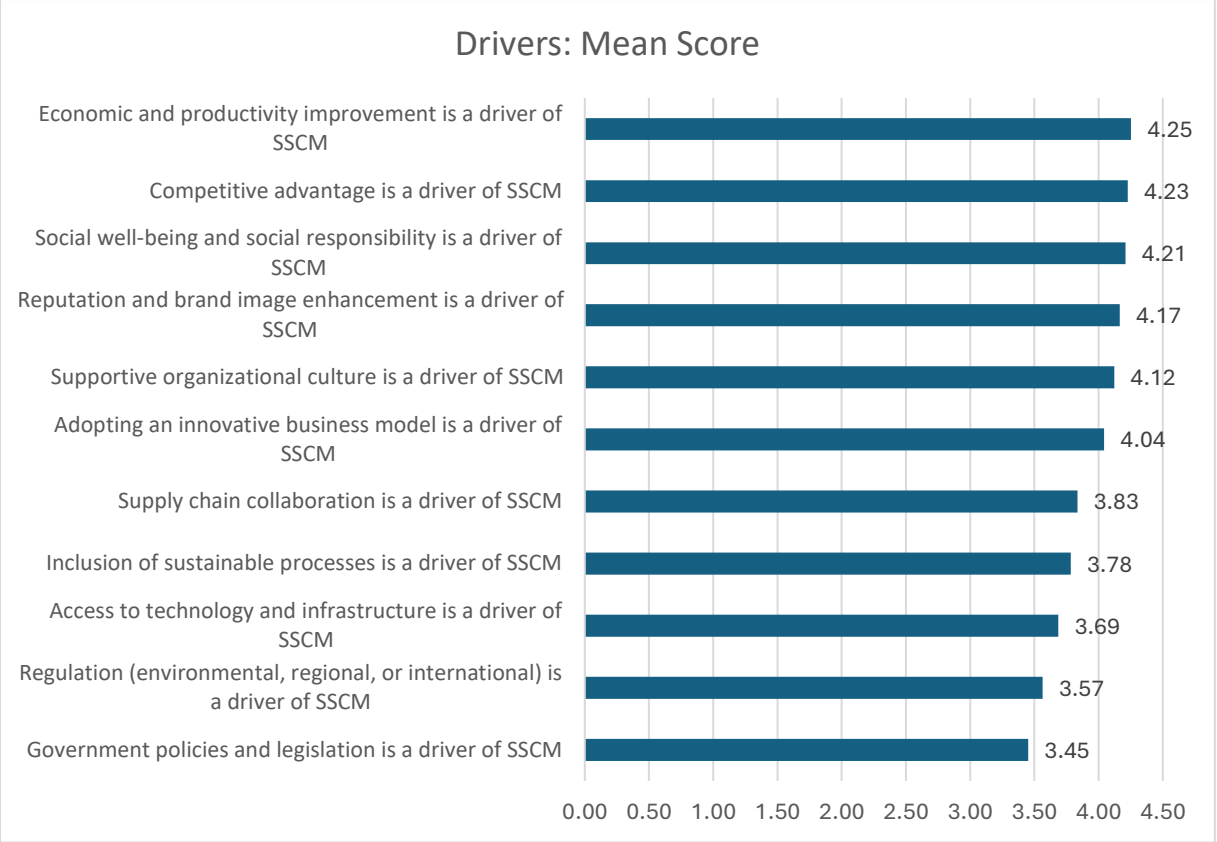


Figure 5.1: Ranking of drivers to adopt SSCM

Regarding the enablers to successfully implement sustainability initiatives, the top-ranking enablers, as per the survey, are cost effectiveness and improvements in overall performance with a mean score of 4.20; joint efforts, planning and capacity building with a score of 4.10; understanding customer and stakeholder requirements with a score of 4.03; monitoring and auditing the ongoing supply chain activities with a mean score of 4.03; understanding the sustainability initiative's importance and benefits with a score of 3.92; resources allocation and information sharing within and across organizations with a mean score of 3.84. This result is similar to the findings of Mangla et al. (2018), who conducted a survey of the Indian agrifood supply chain. The enabler cost effectiveness and improvement in the overall performance is ranked last in the study conducted by Mangla et al. (2018) whereas it is ranked first in this study. The detail classification of the enablers to adopt SSCM in the Ethiopian Coffee Industry is shown in Figure 5.2.

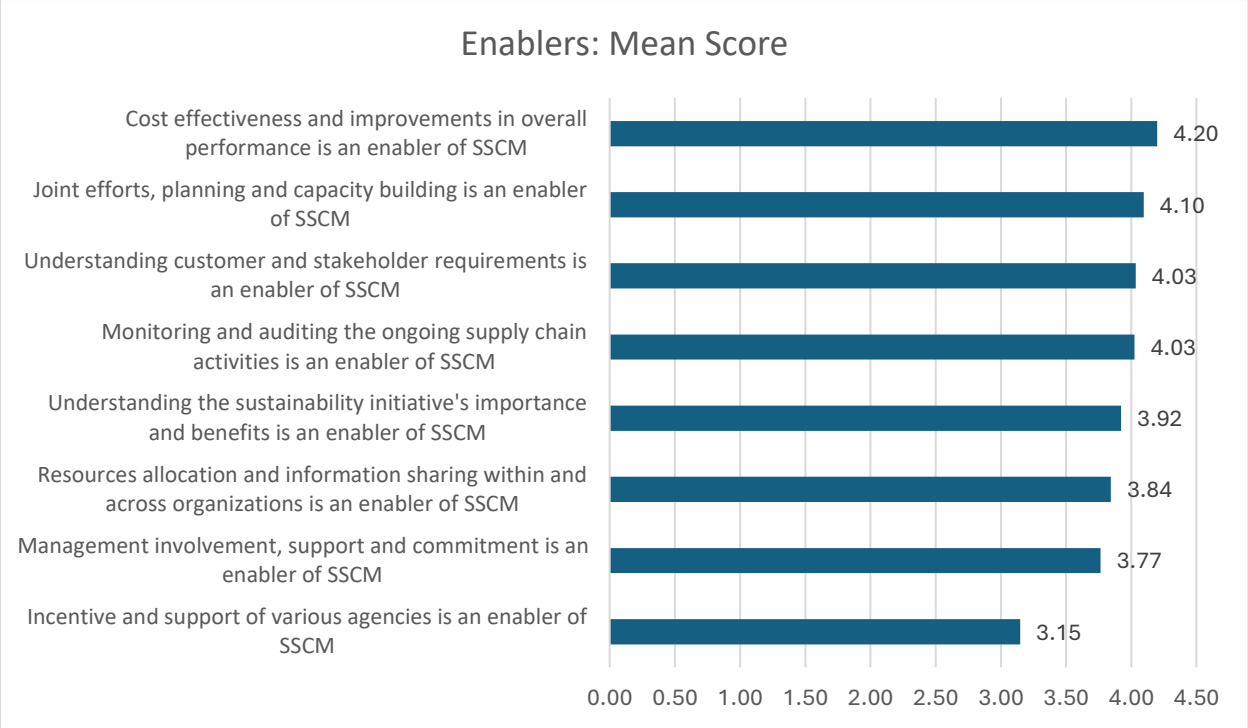


Figure 5.2: Ranking of enablers to adopt SSCM

The next task is to rank the barriers to implementing SSCM in the agrifood supply chain, from the perspective of the Ethiopian coffee industry. The ranking of all barriers in adopting sustainability initiatives is depicted in Figure 5.3. According to the survey result, difficulty in mindset and cultural changes with a mean score of 4.06, lack of proper technology and infrastructure with a score of 3.97, lack of top and middle management support with a mean score of 3.95, lack of government support with score of 3.93, high financial costs and lack of resources with a score of 3.90, and communication gaps and inadequate collaboration between parties with mean score of 3.89 are the most relevant barriers. This finding is consistent with that of a study conducted by Guimarães et al. (2022) on the Brazilian coffee supply chain. However, their findings seem slightly different because they identified financial costs, and lack of resources and high complexity as top-ranking barriers.

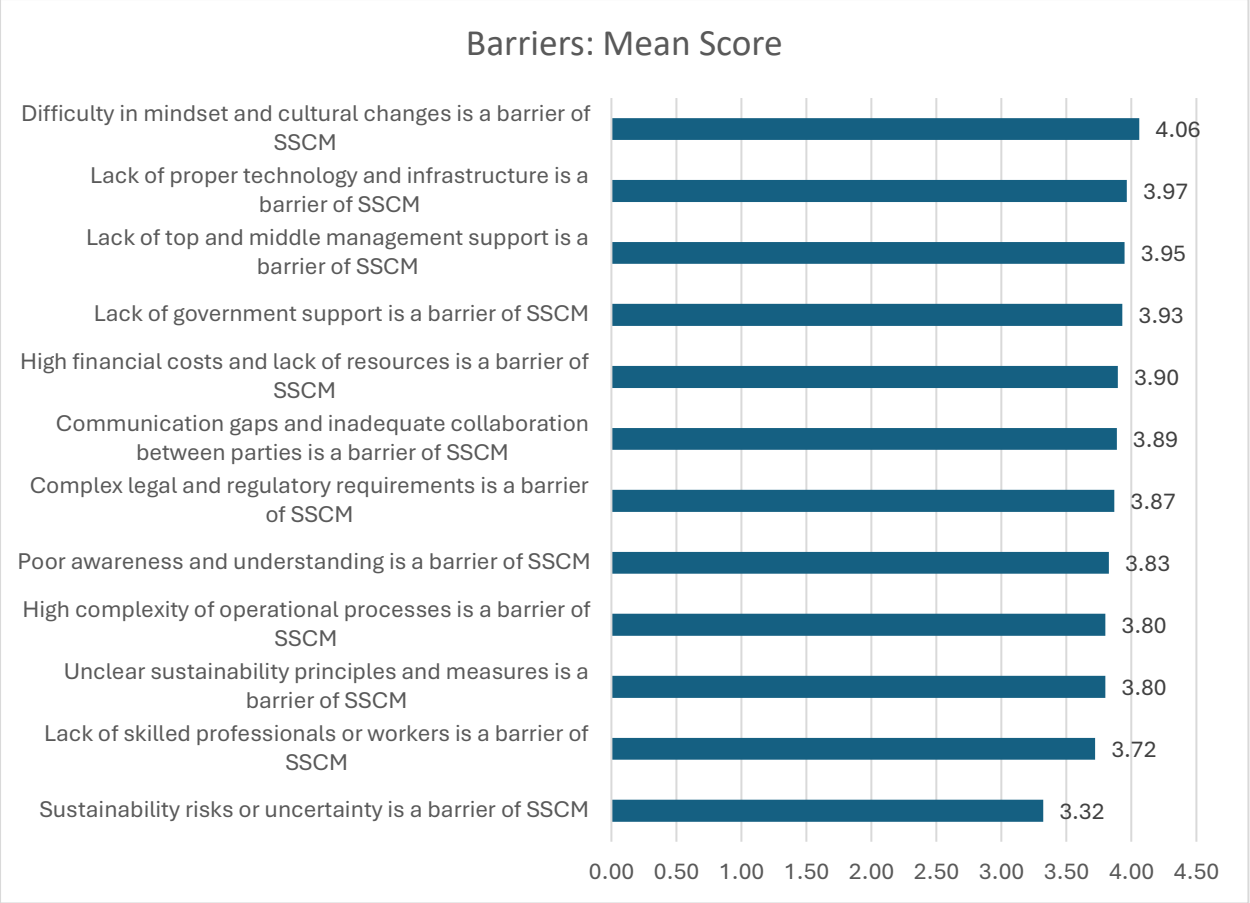


Figure 5.3: Ranking of barriers to adopt SSCM

Based on the literature review, the study has identified 31 critical factors that determine the adoption of SSCM initiatives. Among the critical factors, eleven were drivers, eight were enablers, and the remaining twelve were barriers. To rank these critical factors from the perspective of the Ethiopian coffee supply chain, a survey was conducted with the participation of 115 respondents from the coffee producing and exporting organizations. Based on the survey, the key drivers that drive the adoption of SSCM initiatives are economic and productivity improvement, competitive advantage, social well-being and social responsibility, reputation and brand image enhancement, supportive organizational culture, and adopting an innovative business model. Moreover, among the list of enablers, cost effectiveness and improvements in overall performance, joint efforts, planning and capacity building monitoring, understanding customer and stakeholder requirements, monitoring and auditing the ongoing supply chain activities, understanding the sustainability initiative's importance and benefits, and resources allocation and information sharing within and across organizations are the top-ranked enablers. Finally, from the barriers identified in the literature, difficulty in mindset and cultural changes, lack of proper technology and

infrastructure, lack of top and middle management support, lack of government support, high financial costs and lack of resources, and communication gaps and inadequate collaboration between parties are rated as the most relevant barriers from the Ethiopian coffee industry perspective. The summary of the relevant drivers, enablers, and barriers to adopt SSCM into the Ethiopian coffee industry can be seen in Table 5.1.

Table 5.1: The key drivers, enablers, and barriers of SSCM

S.N	Drivers	Enablers	Barriers
1	Economic and productivity improvement	Cost effectiveness and improvements in overall performance	Difficulty in mindset and cultural changes
2	Competitive advantage	Joint efforts, planning and capacity building monitoring	Lack of proper technology and infrastructure
3	Social well-being and social responsibility	Understanding customer and stakeholder requirements	Lack of top and middle management support
4	Reputation and brand image enhancement	Monitoring and auditing the ongoing supply chain activities	Lack of government support
5	Supportive organizational culture	Understanding the sustainability initiative's importance and benefits	high financial costs and lack of resources
6	Adopting an innovative business model.	Resources allocation and information sharing within and across organizations	Communication gaps and inadequate collaboration between parties

Source: author's own work

The detail description of the methods and techniques applied to identify and rank the drivers, enablers and barriers that determine the adoption of SSCM is presented in the published article with a title, critical factors to adopt sustainable agrifood supply chain management in developing countries: the case of Ethiopian coffee industry (refer to Appendix A.1)

5.3 Data preparation and administration of the main survey

5.3.1 Questionnaire administration and response rate

The empirical survey was conducted on selected coffee producers and exporters to analyze the practices of SSCM in the Ethiopian coffee industry. Empirical data were collected from the members of the Ethiopian Coffee Association. The association has 511 registered members involved in the production and export of coffee, 350 of whom were selected for the survey based on their size and experience in the industry with help of the general manager of the association. A total of 218 managers from coffee producers and exporters completed and returned questionnaires, which accounted for a response rate of 43%. Out of the 218 questionnaires, 16 were deemed to be incomplete and unusable, so they were excluded from further analysis. Even though incomplete surveys still yield some data, researchers frequently discard these surveys to lower the rate of missing data in statistical analysis as well as enhance the reliability of results (Hair et al., 2006).

As a result, in the survey 202 respondents with managerial positions from coffee producing and exporting companies participated. The characteristics of the companies surveyed and the respondents that represent the companies are summarized in Table 5.2. Among the surveyed enterprises a significant majority, 126 (62%), are organized with private limited company form of business ownership, whereas the remaining 76 (38%) have partnership, share company, sole proprietorship, partnership, or cooperatives form of ownership. Amongst the respondents 61 (30%) are logistics managers, 49 (24%) are operation managers, 33 (20%) are general managers, 34 (17%) are supply chain managers, and only 17 (8%) are plant managers. In addition, 100 (49%) of the respondents have one to four years of experience, 74 (37%) have 5 up to 9 years, and 28 (14%) respondents have 9 to 12 years of experience in the job positions. Regarding the educational background of the respondents, 139 (69%) have first degree, 52 (26%) have second degree, and only 11 (5%) have qualifications below first degree. From the respondents' profile one can understand that the participants have adequate educational background and work experience to adequately provide sufficient information for the survey.

Table 5.2: Characteristics of participating organizations and individuals

Form of Ownership	**Count**	**Percentage**
Cooperative Co	7	3.4%
Partnership	11	5.4%
Partnership Co	21	10.4%
Private Ltd Co	126	62.4%
Share Co	14	7.0%
Sole Proprietorship	23	11.4%
Job Position	**Count**	**Percentage**
General Manager	41	20.3%
Logistics Manager	61	30.2%
Operation Manager	49	24.3%
Plant Manager	17	8.4%
Supply Chain Manager	34	16.8%
Experience in the Current Position	**Count**	**Percentage**
1 – 4 Years	100	49.5%
5- 8 Years	74	36.6%
9- 12 Years	28	13.9%
Educational Background	**Count**	**Percentage**
Diploma	11	5.5%
First Degree	139	68.8%
Second Degree	52	25.7%

Source: author's own work

5.3.2 Nonresponse bias analysis

As the data collection procedure to obtain the required data for the study took longer time, more than six months, it is important to check nonresponse bias. Therefore, the researcher conducted a paired sample t-test, taking samples from the early and lately collected survey questionnaires to check for nonresponse bias. A paired t-test is used to compare two sample means where the means of early 50 and late 50 responses are calculated. If there is a significant difference between early and late responses, then non-response bias exists in the data.

Table 5.3: Summary of paired t-test

Variable	Paired Group	N	Mean	Std Deviation	t-statistics	Sig (2 -tailed)
Drivers (DRI)	Early	50	2.8168	0.71142	-1.367	0.178
	Late	50	2.9834	0.65600		
Enablers (ENA)	Early	50	3.8668	0.67055	-0.932	0.356
	Late	50	3.9996	0.59635		
Barriers (BAR)	Early	50	3.3206	0.83164	-1.558	0.119
	Late	50	3.5392	0.79343		
	Early	50	3.8144	0.59256	0.184	0.855

Environmental Sustainability Practices (ESP)	Late	50	3.7890	0.62322		
Social Sustainability Practices (SSP)	Early	50	3.7110	0.61236	-1.864	0.068
	Late	50	3.9062	0.54433		
Outcomes of Sustainability Practices (ESP)	Early	50	3.5488	0.77667	-1.431	0.159
	Late	50	3.7832	0.75136		

Source: author's own table based on SPSS output

As can be seen from the results presented in Table 5.3, all the six constructs of the study have a P value greater than 0.005 (p> 0.05), which indicates there is no significant difference between the two early and late sample responses. Subsequently, the researcher has inferred that there is no difference in the responses between those who responded and those who did not respond. Similarly, there is no significant difference between early and late responses obtained for this study.

5.4 Descriptive statistical analysis

First the survey responses were entered into Microsoft Excel and then exported to SPSS version 28 for windows to perform statistical analysis. The SPSS software allows quantitative data to be managed and analyzed, which includes frequency, means, standard deviation, correlation, regression, and exploratory factor analysis of the collected data. It also allows thorough statistical comparative analysis of the data between the various classifications of the research theme to test for association or differences among organizations under study. The SPSS software allows quantitative data to be analyzed using analytical tools such as frequency, means, standard deviation, correlation, regression, and exploratory factor analysis of the collected data. It also allows thorough statistical comparative analysis between the various classifications of the research theme to test for association or differences among the variables under study.

To address the research questions and objectives a primary data was collected from selected coffee producers and exporters in the Ethiopian coffee supply chain. To collect the data a questionnaire was prepared and distributed to the respondent managers based on the information obtained from the Ethiopian Coffee Association. Once the data collection process was finalized, each questionnaire was checked for completeness. After ensuring the completeness of the survey response, each questionnaire was coded with unique identification number. Finally, the data obtained from each respondent was entered into an excel file. A data set of 202 firms has been formed and each construct was coded using unique

identification codes. Accordingly, each construct in the conceptual framework was coded as follows: Drivers- DRI, Enablers- ENA, Barriers- BAR, Environmental Sustainability Practices- ESP, Social Sustainability Practices- SSP, and Outcomes of Sustainability Practices- OSP.

As per Field (2009), it is important to check for missing data and ensure the normal distribution of the data before conducting any statistical analysis. Accordingly, the first step after the entry was to check for any missing data and ensure the completeness of the data set. After confirming that there is no missing data, the next step was to check the normal distribution of the data. To ensure appropriateness of the data collected, the data is checked for whether it has normal distribution pattern and is presented as follows in the next section.

5.4.1 Assessment of the statistical distribution of the data

It is crucial to assess the characteristics of the data to determine the normal distribution of the variables before performing inferential statistical analysis. The term "normal" is used to describe a distribution of data that displays a bell-shaped, symmetrical curve, with the maximum frequency of scores concentrated in the center and decreasing towards the two extreme ends (Pallant, 2020) . Accordingly, to check the appropriateness of the collected data and ensure whether the data is normally distributed, the researcher has transferred the 202 data sets from Excel into an SPSS package version 28. The mean values for the research constructs, i.e., drivers (DRI), enablers (ENA), barriers (BAR), environmental sustainability practices (ESP), social sustainability practices (SSP) and outcomes sustainability practices (OSP), were then computed by averaging the measurement items in the variables for all samples. The next step was to select the average value of each variable in SPSS to carry out descriptive statistics to summarize the distribution of each variable's data. Furthermore, skewness and kurtosis tests were carried out together with the descriptive statistics analysis, since skewness and kurtosis coefficients are also appropriate statistical indicators of acceptable data regarding its normal distribution (Field, 2009). The descriptive statistics in the SPSS output are presented in Table 5.4.

Table 5.4: Descriptive statistics

Construct	N	Mini.	Maxi.	Mean	Std. Deviation	Skewness	Kurtosis
Drivers (DRI)	202	1	5	2.9414	0.76522	0.000	0.112
Enablers (ENA)	202	2	5	3.9954	0.63309	-0.664	1.204
Barriers (BAR)	202	1	5	3.4898	0.77149	-0.393	0.196
Environmental Sustainability Practices (ESP)	202	1	5	3.8401	0.59858	-0.917	2.701
Social Sustainability Practices (ESP)	202	1.14	5	3.8384	0.62930	-0.685	1.821
Outcomes of Sustainability Practices (OSP)	202	1	5	3.6298	0.73738	-0.371	0.387

Source: author's own table based on SPSS output

As per Field (2009), the skewness and kurtosis coefficients, which decide the normality characteristics of data, should have values between -2.00 and +2.00. Since both the skewness and kurtosis coefficients are within the suggested range, the data collected for this study exhibits a normal distribution for each variable. Therefore, this validates that almost every variable has a normal data distribution, supporting the assumption that the data is normal. In addition, the researcher has produced histograms and normal Q-Q plots for each variable using SPSS. Histogram is a popular and well-known visualization method and uses bars to display the tabulated frequency at specific intervals to depict the distribution of univariate data (Nuzzo, 2019; Sahann, Müller and Schmidt, 2021).

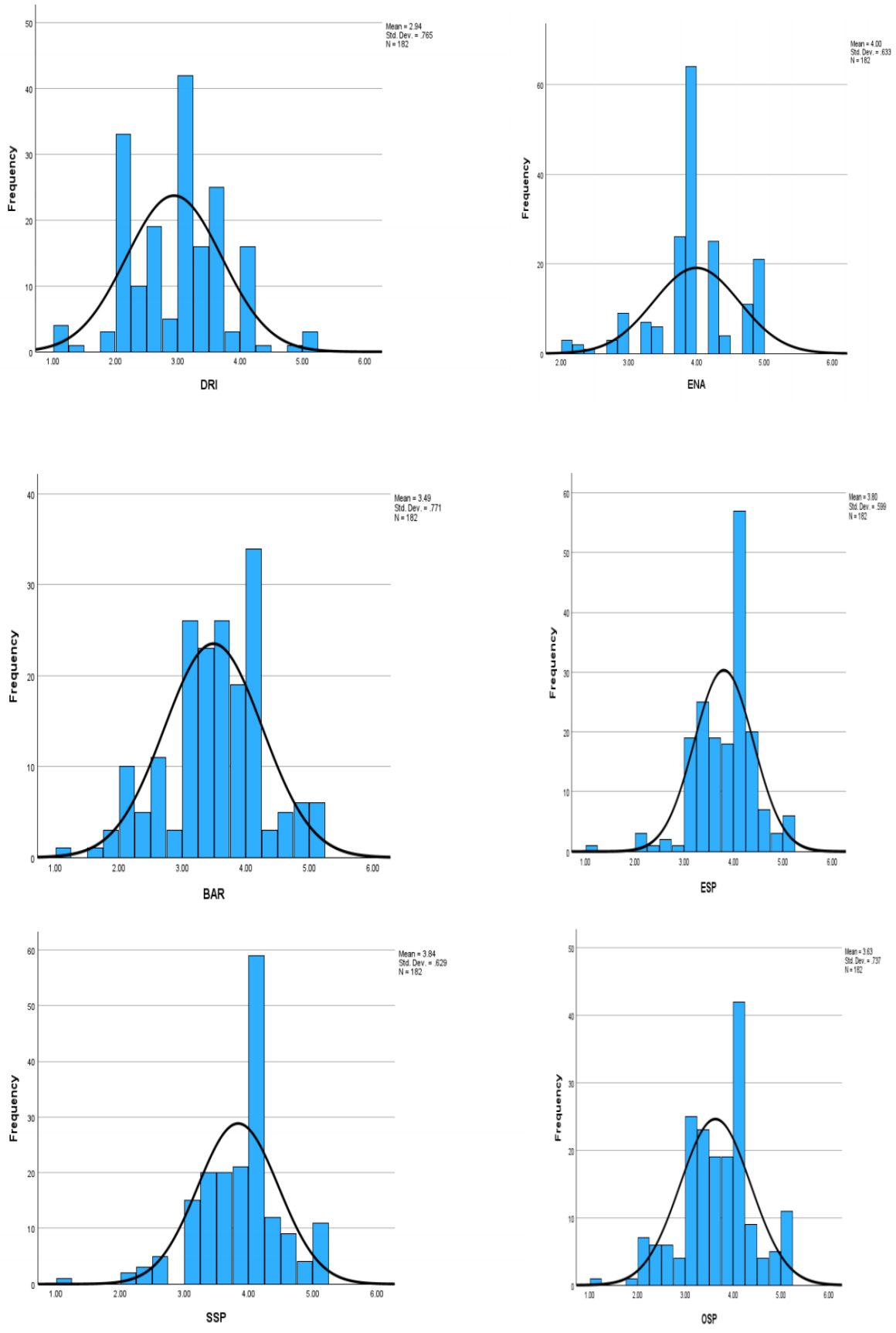


Figure 5.4: Histograms of DRI, ENA, BAR, ESP, SSP, and OSP variables for data distribution.

Quantile - Quantile (Q–Q) plot is arguably the most widely used method and an essential tool for visually evaluating a specific distributional assumption (Loy, Follett and Hofmann, 2016). Furthermore, as can be seen from the normal Q-Q plots, shown in Figure 5.4, the observed value for each score is plotted against the expected value from the normal distribution which is reasonably straight line suggests a normal distribution.

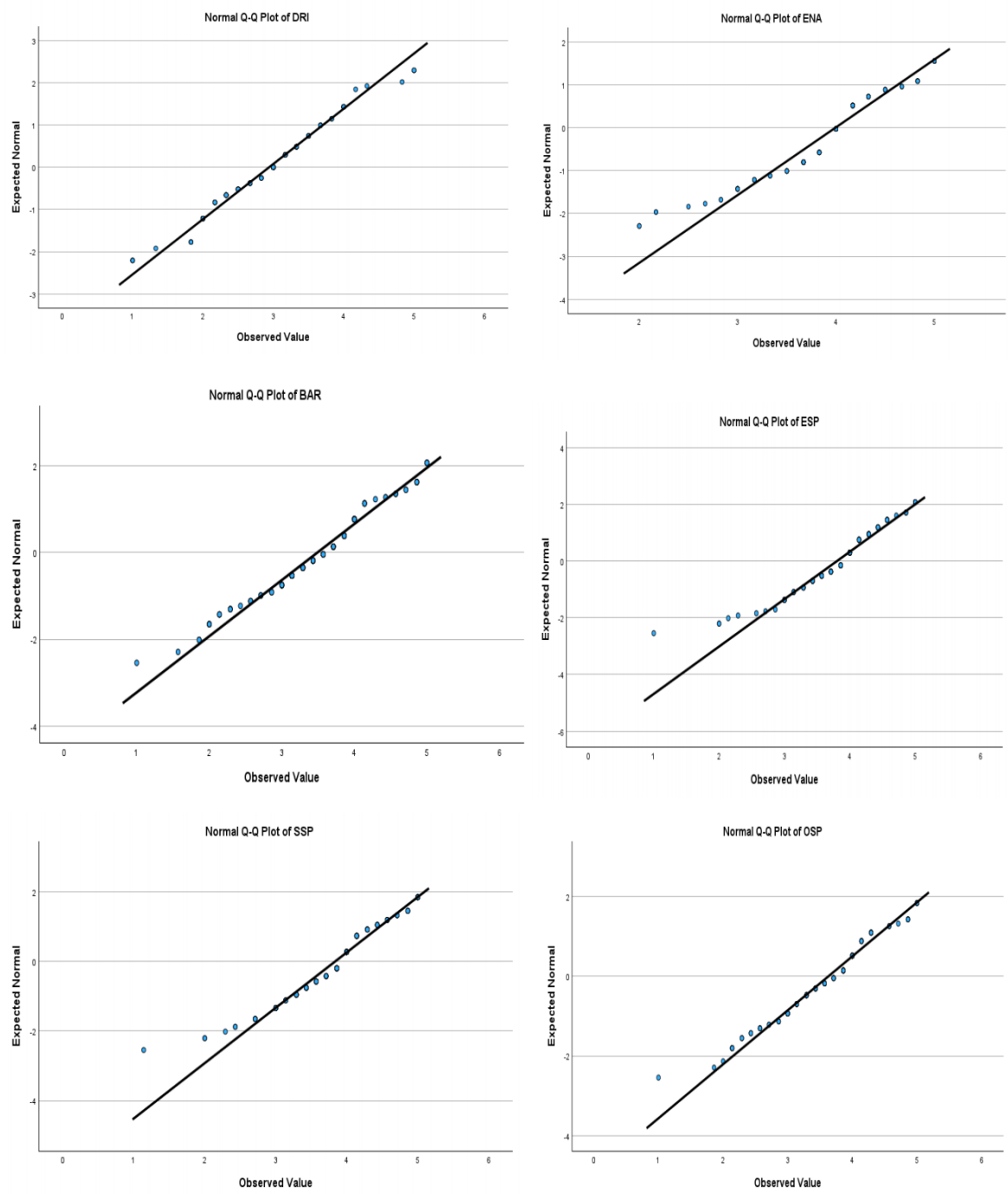


Figure 5.5: Normal Q-Q Plot of DRI, ENA, BAR, ESP, SSP, and OSP variables.

5.4.2 Quality of the survey data

After addressing the appropriateness of the data collected with respect to the likelihood of missing data as well as the data's normal distribution, it is essential to address the implications of data quality prior to doing the statistical analysis. In both quantitative and qualitative social research, data quality is a critical concern because it is one of the key indicators for determining the accuracy and reliability of findings, preserving the strength of study findings (Stockemer, Stockemer and Glaeser, 2019). Reliability and validity, the two primary complementary concepts, are widely used to determine the quality of data (Saunders, Lewis and Thornhill, 2019). Furthermore, Vu (2021) has confirmed that validity and reliability are among critical concepts to determine the quality of a research.

Reliability can be defined as the consistency and stability of the findings obtained from a research study (William, 2024). The study is believed to be reliable when it delivers consistent results under the same conditions and overtime. On the other hand, validity determines how broadly the research findings can be generalized and it is thought to be the most significant criterion of research quality. Essentially, validity is concerned with truthfulness and refers to the degree to which a concept being tested accurately correlates to the real world, or social reality (Bell, Bryman and Harley, 2022). Moreover, according to William (2024) validity mainly has to do with the degree to which a study measures or reflects the concepts it intends to measure.

There are three main aspects of research validity in quantitative studies: face validity, content validity and construct validity. Based on the literature reviewed, face validity refers to the clarity, relevance, difficulty, and sensitivity of a test to its intended audience (Allen, Robson and Iliescu, 2023). Whereas, content validity, also known as "logical validity" and "definition validity," quantifies the degree to which instrument items accurately reflect the topic or subject matter that the instrument is intended to assess (Newman, Lim and Pineda, 2013). Besides, construct validity determines how well a test or scale measures a theoretical construct (William, 2024). Generally, all types of validity primarily assess an indicator's ability to gauge the theoretical idea for which it was designed or the degree to which the indicator measures what it is supposed to measure (Hair et al., 2010).

In this study, validity was evaluated subjectively in terms of facial as well as content validity and experimentally in the form of construct validity, comprising both convergent and discriminant validity. The face validity of this study was guaranteed by our extensive pilot test,

which involved conducting a pre-test of the measures used with several academics with expertise in logistics and supply chain management. The face validity of the measurement scales was proved through the participation of academics and professionals in logistics and supply chain management and validated the correlation between the indicators and their associated constructs. Regarding the content validity, since every measurement scale of this research has been extracted directly from earlier studies that were already verified for content validity and used in other published studies, for example, (Golini et al., 2017; Mangla et al., 2018; Guimarães et al., 2022; Adams, Donovan and Topple, 2023; Ouro-Salim and Guarnieri, 2023; Singh et al., 2023).

Furthermore, construct validity is usually empirically verified through factor analysis. Therefore, the construct validity of this study is confirmed by verifying convergent validity by conducting exploratory factor analysis (EFA). The process of verifying the construct validity of this study's theoretical constructs is discussed in the next sections.

According to Sürücü and Maslakçi (2020), reliability is defined as the ability of a measuring instrument to give similar results when applied at different times. The reliability of the measuring instrument is an essential component in determining the trustworthiness of the results of the study. Hence, for a measuring technique or measurement scale to be considered reliable, the numerical results produced by its indicators must not vary due to the characteristics of measurement procedure or the measurement scale itself (Hair et al., 2010). As per Kaplan (2004), in quantitative research reliability can be determined predominantly by Cronbach's α (alpha) value. As a result, Cronbach's α (alpha) is a commonly used to determine the reliability which is concerned with the consistency of a research measure by examining how closely a set of indicators are related to one another as a group (Hair et al., 2010). According to DeVellis and Thorpe (2021) and Hair et al. (2021) the acceptable value for Cronbach's α (alpha) which indicates high construct reliability is ideally 0.70 or more. Therefore, the researcher has conducted an empirical analysis of the reliability of every research variable using the SPSS software package. The summary of the reliability analysis of all variables and the Cronbach's alpha value of the research are presented in Table 5.5.

Table 5.5: Summary of the reliability statistics

Variable	N	N of Items	Cronbach's Alpha
Drivers (DRI)	202	6	0.909
Enablers (ENA)	202	6	0.949
Barriers (BAR)	202	6	0.940
Environmental Sustainability Practices (ESP)	202	7	0.898
Social Sustainability Practices (ESP)	202	6	0.921
Outcomes of Sustainability Practices (OSP)	202	9	0.932

Source: author's own table based on SPSS output

As illustrated on Table 5.6, Cronbach's alpha values of all the research variables are higher than the ideally suggested 0.70 threshold, which indicates strong construct reliability. As a result, considering the average reliability coefficient of all variables (0.924), the researcher can conclude that the overall reliability of all the study variables was satisfactory enough. Furthermore, the high overall reliability coefficient implies that internal consistency is confirmed among the study variables and suggesting very good internal consistency reliability (Henseler, Hubona and Ray, 2016; Hair et al., 2021).

5.4.3 Exploratory factor analysis

As the number of items in the questionnaire for the constructs environmental and social sustainability practices are high, the researcher preferred to apply summed scale for these two constructs. According to Hair et al. (2013) a summated scale approach can be applied on items in a way to actually represent the constructs and there is theoretical justification. A summated scale is a composite value for a group of variables that is determined by taking the average of the values in the scale. It is similar to the variables in other multivariate techniques, with the exception that the averaging procedure assumes that the weights of each variable are equal. After the actual construction of the summated scales the scales should also be evaluated for reliability and validity (Hair et al., 2013). Factor analysis is a crucial instrument used in the development, improvement, as well as the evaluation of scales, tests, and measurements (Williams, Onsman and Brown, 2010). Exploratory factor analysis (EFA) is frequently applied and commonly used statistical method in social science and other field of studies (Taherdoost, Sahibuddin and Jalaliyoon, 2022). According to Williams, Onsman and Brown (2010), factor analysis is a multivariate statistical technique with a wide range of applications, including the reduction of many variables into a smaller set, the establishment of underlying dimensions between latent constructs and measured variables, and the provision of construct validity confirmation for self-reporting scales.

One of the unique qualities of exploratory factor analysis is its ability to show researchers how many factors are needed to adequately reflect the research measure in a situation that one underlying factor is insufficient to explain all observed variables (Hair et al., 2021). Exploratory factor analysis comprises a procedure to reduce the number of observed variables to make sure that the remaining variables reflect a single underlying factor, demonstrating that each observed variable contributes to the research measure that establishes the construct validity (Kaplan, 2004). Hence, the exploratory factor analysis technique can be used regardless of the knowledge of the number of factors included in each measure (Field, 2009). Exploratory factor analysis can offer guidance on how to improve the study measures and the corresponding observed variables, attain a single underlying factor and guarantee construct validity (Hair et al., 2021).

After providing the basic background information on the exploratory factor analysis technique, next the researcher has described its application in this study. A total of forty items from six constructs, DRI, ENA, BAR, ESP, SSP and OSP, were subjected to exploratory factor analysis. SPSS Statistics version 28 is used to run principal axis factoring method, to get the suitable factors for this research and eliminate redundant items.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is statistics used to assess if factor analysis is adequate given the study sample. As vividly explained by Kaiser (1974, p.35), the KMO values can characterized as follows: “in the 0.90s marvelous; in the 0.80s meritorious; in the .70s middling; in the .60s mediocre; in the .50s, miserable; below .50, unacceptable” (p. 35). Generally, a high statistic value between 0.5 and 1 denotes that the factor analysis is appropriate for the given data, whereas a low statistic value below 0.5 denotes that the factor analysis is improper (Hair et al., 2010). In the initial exploratory factor analysis result, two items i.e. OSP8: Increase in market share and OSP9: Penetration into new markets, have loaded onto factors other than their underlying factor, and the item SSP6: Socially responsible purchasing failed to load on any dimension significantly. Hence, these three items were eliminated from further analysis. Hence, the researcher has repeated the exploratory factor analysis without including these three items. The results of the second analysis confirmed the six -dimensional structure theoretically defined in the research. The exploratory factor analysis further solidified the research assumption regarding the necessary sample size by lowering the number of measuring items from 40 to 37. Based on the rule of thumb, it is advised that SEM analysis employ at least five samples for each observed variable

or measuring item. Since there are 37 items left, the necessary sample size is 185 (37*5), which is lower than the sample size that the researcher had already determined, i.e., 202.

Table 5.6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.879
Bartlett's Test of Sphericity Approx.	Chi-Square	5565.769
	df	666
	Sig.	.001

Source: author's own table based on SPSS output

As can be seen from Table 5.6, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value of this study is 0.879, which shows the data collected for this study is appropriate and adequate. Bartlett's test of sphericity is a test statistic used to verify whether the variables in a factor analysis are suitable for analysis. According to Bartlett (1954), Bartlett's test of sphericity is an objective test of the factorability of the correlation matrix, which statistically tests the hypothesis that the correlation matrix contains ones on the diagonal and zeros on the off diagonals. That is, the population correlation matrix is an identity matrix; each variable correlates perfectly with itself (r = 1) but has no correlation with the other variables (r = 0). Therefore, the outputs of Bartlett's test of sphericity implied that the correlation matrix is not random, x^2 (202) = 5565.769 p < .001, and the KMO statistic 0.879, which is well above the minimum standard for running factor analysis. Therefore, it is proven that the correlation matrix was suitable for factor analysis.

Furthermore, to determine the ideal number of factors for this study, the researcher has extracted the eigenvalue which represents the total variance explained by each factor. According to Watkins (2018), eigenvalues can be used for determining the optimal number of factors that should be retained. Kaiser's criterion is an approximation that can be applied to determine the number of factors to be retained (Yong and Pearce, 2013). According to Kaiser (1960) criterion, all factors over the eigenvalue of 1 should be kept for further analysis. As a result, the factor analysis solution obtained from the SPSS output has yielded six factors for the scale, which accounted for 67.811 per cent of the cumulative variation in the data. In addition, the number optimal factors to retain is confirmed through a scree plot. The scree plot comprises of eigenvalues and factors (Cattell, 2012), the optimum number of factors to be maintained is determined by taking the data points that are above the point of inflection (Yong and Pearce, 2013) excluding the point at which the break occurs. As shown in Figure

5.6, the point of inflexion is factor six, which indicates the optimal number of factors for this study is six.

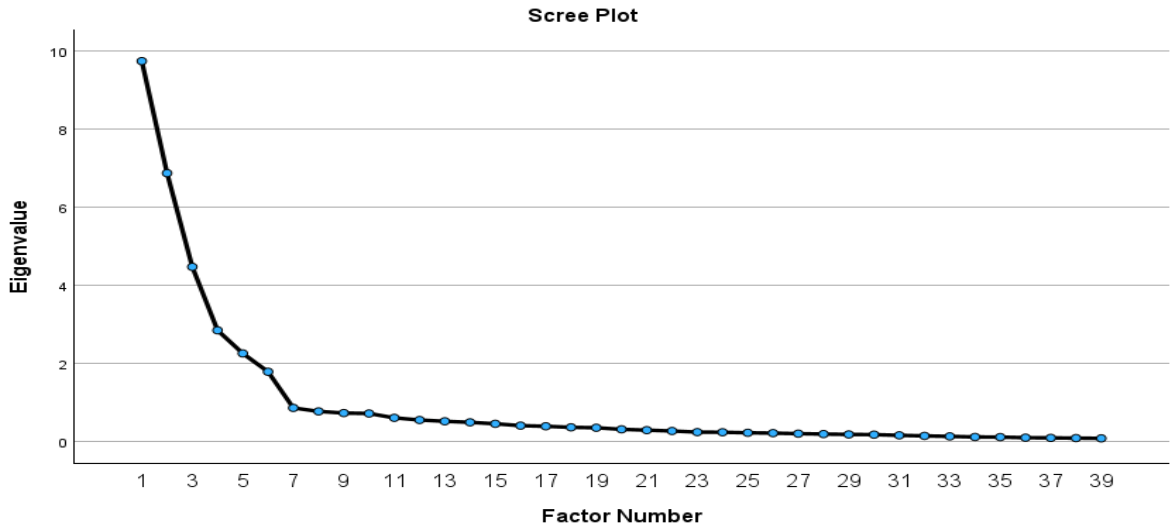


Figure 5.6: SPSS output for scree plot.

The exploratory factor analysis was performed using a principal axis factoring and varimax rotation. The minimum factor loading criteria was set to 0.50 and the results show that all communalities were 0.50 and above. The communality of the scale, which indicates the amount of variance in each dimension, was also assessed to ensure acceptable levels of explanation. Summary of the six factors, the items in each factor and the factor loading values are presented in Table 5.7.

Table 5.7: Summary of the EFA result

Item	1	2	3	4	5	6
Drivers of SSCM						
DRI1	0.575					
DRI2	0.794					
DRI3	0.737					
DRI4	0.738					
DRI5	0.782					
DRI6	0.804					
Enablers of SSCM						
ENA1		0.794				
ENA2		0.864				
ENA3		0.874				
ENA4		0.882				
ENA5		0.855				
ENA6		0.725				
Barriers of SSCM						
BAR1			0.753			

BAR2			0.864			
BAR3			0.837			
BAR4			0.880			
BAR5			0.792			
BAR6			0.823			
Environmental Sustainability Practices						
ESP1				0.590		
ESP2				0.827		
ESP3				0.886		
ESP4				0.700		
ESP5				0.735		
ESP6				0.575		
ESP7				0.684		
Social Sustainability Practices						
SSP1					0.653	
SSP2					0.752	
SSP3					0.851	
SSP4					0.765	
SSP5					0.761	
Outcomes of Sustainability Practices						
OSP1						0.637
OSP2						0.828
OSP3						0.763
OSP4						0.784
OSP5						0.805
OSP6						0.737
OSP7						0.808

Source: author's own table based on SPSS output

5.5 Specification of the path model

This section is concerned with the specification of the PLS-SEM path model, that is the structural and measurement models of the study. First, the researcher discusses the process of specifying the structural model. Next, the researcher explains the procedure of specifying the measurement models.

5.5.1 Specification of the structural model

The initial stage of research that applies PLS SEM deals with the preparation of a diagram that illustrates the hypotheses and shows the relationship between the variables that will be examined. Hence, crafting the path model early in the research process enables researchers to organize their thoughts and visually consider the relationships between the variables of the study (Hair et al., 2022b).

A path model in PLS-SEM consists of two components: the measurement model, also known as the outer model, depicts the relationships between the latent variable and its indicators, and the structural model, also known as the inner model, presents the relationships between the latent variables. It should be noted that the sequence of the constructs and their links to one another are the two crucial issues that must be considered when developing a structural model. Both issues are crucial to the concept of modeling because they represent the hypotheses and their relationship to the theory to be examined.

The researcher determines the sequence of the constructs in a structural model according to theory, logic, or real-world observations. The sequence is presented from left to right; independent constructs are shown on the left whereas the dependent variables are depicted on the right side. Constructs on the very left of the structural model are known as exogenous latent variables, that function only as independent variables. Exogenous latent variables have arrows that point out of them and never have arrows from other latent variables facing into them. The dependent constructs in a structural model also known as endogenous latent variables are shown on the right side of the model. Constructs that perform both independent and dependent variables in a structural model also are considered endogenous and appear in the middle of the diagram.

The sequence of constructs in a structural model should always be determined based theory and logic; nevertheless, when the literature is inconsistent or ambiguous, researchers should use their best judgment to determine the sequence. It important to keep in mind that there is no unique one model that perfectly captures a phenomenon; instead, researchers can develop and empirically compare theoretically supported multiple models (Burnham and Anderson, 2002).

After deciding on the proposed constructs' sequence, arrows must be drawn to show the relationship between the constructs. The arrowheads of the inserted arrows should point out to the right. This technique shows the sequence and how the constructs in left side predict the construct in right-side of the model. If a causal relationship is supported by the structural theory, the predictive correlations are commonly referred to as causal links. In addition, researchers should develop hypotheses for the constructs and their path relationships in the structural model.

A mediating effect in structural model exists when a third variable or construct interferes between two other related constructs (Nitzl, Roldán and Cepeda, 2017; Memon et al., 2018).

The mediating effects in a path model can be in the form of direct and indirect effects. A direct effect is a connection that involves two constructs with a one arrow. Whereas an indirect effect is a relationship that links a sequence of relations with at least one intervening construct involved. Thus, an indirect effect is a sequence of two or more direct effects that are denoted visually by multiple arrows. This indirect effect is distinguished as the mediating effect.

Generally, the conceptual framework of the study has two main theoretical components: the critical factors of sustainability practices, namely DRI, ENA and BAR, considered as exogenous constructs; and the environmental and social sustainability practices and outcomes of sustainability practices, specifically, ESP, SSP, and OSP, regarded as endogenous constructs. When PLS-SEM is applied, the structural model displays the conceptual framework with its constructs and the cause-effect relationships among the constructs.

5.5.2 Specification of the measurement models

The measurement models portray the relationships between constructs and the indicator variables that correspond to them (Sarstedt, Ringle and Hair, 2021). Measurement theory serves as the foundation for identifying the relationships between the constructs (Hair et al., 2022b). To get meaningful results with PLS-SEM, a strong measurement theory is a crucial condition. The validity and reliability of hypothesis tests about the structural relationship between constructs depend on how well the measurement models describe the process of measuring these constructs. However, there are usually a few well-established measurement techniques available to researchers, each to some extent different from the others. As a result, majority of social science researchers these days employ validated measurement techniques that have been published in previous studies or scale handbooks that are proven to be reliable (Ramirez, David and Brusco, 2013; Zarantonello and Pauwels-Delassus, 2015; Bruner, 2017).

According to Hair et al. (2022b), researchers need to consider two major types of measurement specifications when developing constructs: reflective and formative measurement models. As per reflective measurement theory, indicators describe the impact of an underlying construct, thus, the causal relationship emanates from the construct to its measures. Reflective indicators can be considered as a sample that is representative of all the items that are possible within the construct's conceptual sphere (Nunnally and Bernstein, 1994). Consequently, since a reflective measure considers each indicator items are affected

by the same construct, all indicators related to a given construct need to have a strong correlation with one another. Furthermore, all items should to be interchangeable to each other, hence, any one item can be eliminated without affecting the construct's meaning, if the construct has sufficient reliability (Hair et al., 2022b). On the other hand, formative measurement models are developed with the assumption that indicators form the construct with linear combinations. Unlike reflective indicators, formative indicators have an essential distinction that is they cannot be used interchangeably; therefore, every indicator of a formative construct measures a particular facet of the construct's domain (Hair et al., 2022b). The construct's meaning is ultimately determined by the indicators taken together, which suggests that the removal of an indicator may change the nature of the construct. Therefore, ensuring a holistic coverage of the construct domain is crucial to confirm that the substance of the focal construct is sufficiently captured (Diamantopoulos and Winklhofer, 2001). The detail description of the measurement model for all constructs of the research model and their corresponding indicators is presented in Tables 5.8. 5.9, and 5.10.

Table 5.8: Specification of the constructs of the critical factors

Constructs	Indicators	Survey questions
		Considering your organization's effort to implement SSCM initiatives, rate the following factors according to their relevance to your organization. (Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent).
Drivers (DRI)	DRI1	Social well-being or social responsibility is a driver
	DRI2	Economic or productivity performance improvement is a driver
	DRI3	Adopting an innovative business model is a driver
	DRI4	Regulations (environmental, regional, international) are drivers
	DRI5	Competitive opportunity or advantage is a driver
	DRI6	Access to technology or infrastructure is a driver
Enablers (ENA)	ENA1	Management involvement, support and commitment is an enabler
	ENA2	Resources allocation and information sharing within and across the hierarchy of an organization is an enabler
	ENA3	Understanding customer and stakeholder requirements
	ENA4	Joint efforts, planning and capacity building for delivering sustainability focused products is a factor
	ENA5	Monitoring and auditing the ongoing supply chain activities is an enabler
	ENA6	Understanding the sustainability initiative's importance and benefits is an enabler
Barriers (BAR)	BAR1	Lack of government support is a barrier
	BAR2	High financial costs or lack of resources are a barrier
	BAR3	High complexity of the processes is a barrier
	BAR4	Difficulty in mindset or cultural changes is a barrier

	BAR5	Communication gaps and inadequate collaboration between parties is a barrier
	BAR6	Information and knowledge gaps or distortion is a barrier

Source: author's own work

Since the constructs of the study's model are not directly observed, the researcher needs to specify a measurement model for each construct. In the PLS-SEM model, the study has six constructs, i.e., drivers (DRI), enablers (ENA), barriers (BAR), environmental sustainability practices (ESP), social sustainability practices (SSP), and outcomes sustainability practices (OSP) are measured by multiple indicators. Considering the reflective measurement theory and measurement scales applied, as the researcher has chosen a reflective measurement models to apply on all the constructs of the study model.

Table 5.9: Specification of the constructs of the SSCM practices

Constructs	Indicators	Survey questions
		Please indicate the extent to which you perceive that your company is implementing each of the following. (Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent).
Environmental Sustainability Practices (ESP)	ESP1	Sustainable process design
	ESP2	Minimization of waste
	ESP3	Improvements of packaging
	ESP4	Environmentally responsible purchasing
	ESP5	Green and reverse logistics
	ESP6	Customer sustainability information
	ESP7	Environmental certification
Social Sustainability Practices (SSP)	SSP1	Human rights
	SSP2	Safety and health
	SSP3	Equality and ethics
	SSP4	Philanthropy and social welfare
	SSP5	Socially responsible purchasing
	SSP6	Employee welfare

Source: autho's own work

All the six constructs of the model have reflective measurement models as explained by the arrows pointing from the constructs to the indicators. For instance, the drivers (DRI) construct is measured with six reflective indicators, namely DRI1, DRI2, DRI3, DRI4, DRI5 and DRI6. In addition, all indicators are measured using the questions in the survey questionnaire and respondents had to indicate the degree to which they agree or disagree with each of the statements on a five-point scale from 1 = fully disagree to 5 = fully agree.

Table 5.10: Specification of the constructs of the performance outcomes

Constructs	Indicators	Survey questions
		Please indicate the extent to which you perceive that your company has achieved each of the following during the past year. (Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent).
Outcomes of Sustainability Practices (OSP)		**Environmental Performance**
	OSP1	Reduction in solid and water waste
	OSP2	Reduction of environmental accidents
	OSP3	Decrease in consumption of hazardous toxic materials
		Social Performance
	OSP4	Improvement of company images
	OSP5	Enhancement of corporate images as an ethical organization
	OSP6	Improved employee or community health and safety
		Economic Performance
	OSP7	Increase in sales of coffee
	OSP8	Reduction in costs of processing and distribution
	OSP9	Increase in organizational profit and profit margins

Source: author's own work

5.6 Evaluation of the measurement model of the study

This section illustrates the evaluation process to attest the quality of the reflective measurement models estimated by PLS-SEM, both in in terms of reliability and validity. The evaluation of the reflective measurement models includes assessing the reliability of measures, on both indicator reliability and internal consistency reliability. Whereas validity assessment is concerned with each measure's convergent validity using the average variance extracted (AVE). In addition, the heterotrait-monotrait (HTMT) ratio of correlations is used to assess a reflectively measured construct's discriminant validity in comparison with other construct measures in the model. In the following subsections, both indicator reliability and internal consistency reliability is applied to evaluate measurement model of the study.

5.6.1 Assessment of indicator reliability

The primary step in the reflective measurement model assessment is concerned with assessement of the outer loadings of the indicators. High outer loadings on a construct signify that the connected indicators have much in common, which is acquired by the construct. The magnitude of the outer loading is also usually known as indicator reliability. At a minimum, the outer loadings of all indicators should be greater than or equal to 0.708 and statistically significant. The justification behind this rule of thumb can be understood in the context of the square of a standardized indicator's outer loading, referred to as the communality of an item. The square of a standardized indicator's outer loading represents how much of the variation

in an item is explained by the construct and is defined as the variance extracted from the item. An established rule of thumb is that a latent variable should explain a substantial part of each indicator's variance, usually at least 50%. The remaining percentage represents an indicator's unexplained variance also known as measurement error. Explaining at least 50% of an indicator's variance implies that the variance shared between the construct and its indicator is larger than the measurement error. Hence, an indicator's standardized outer loading, as specified by the PLS-SEM results, should be 0.708 or above since that number squared (0.7082) equals to 0.50 (Hair et al., 2021).

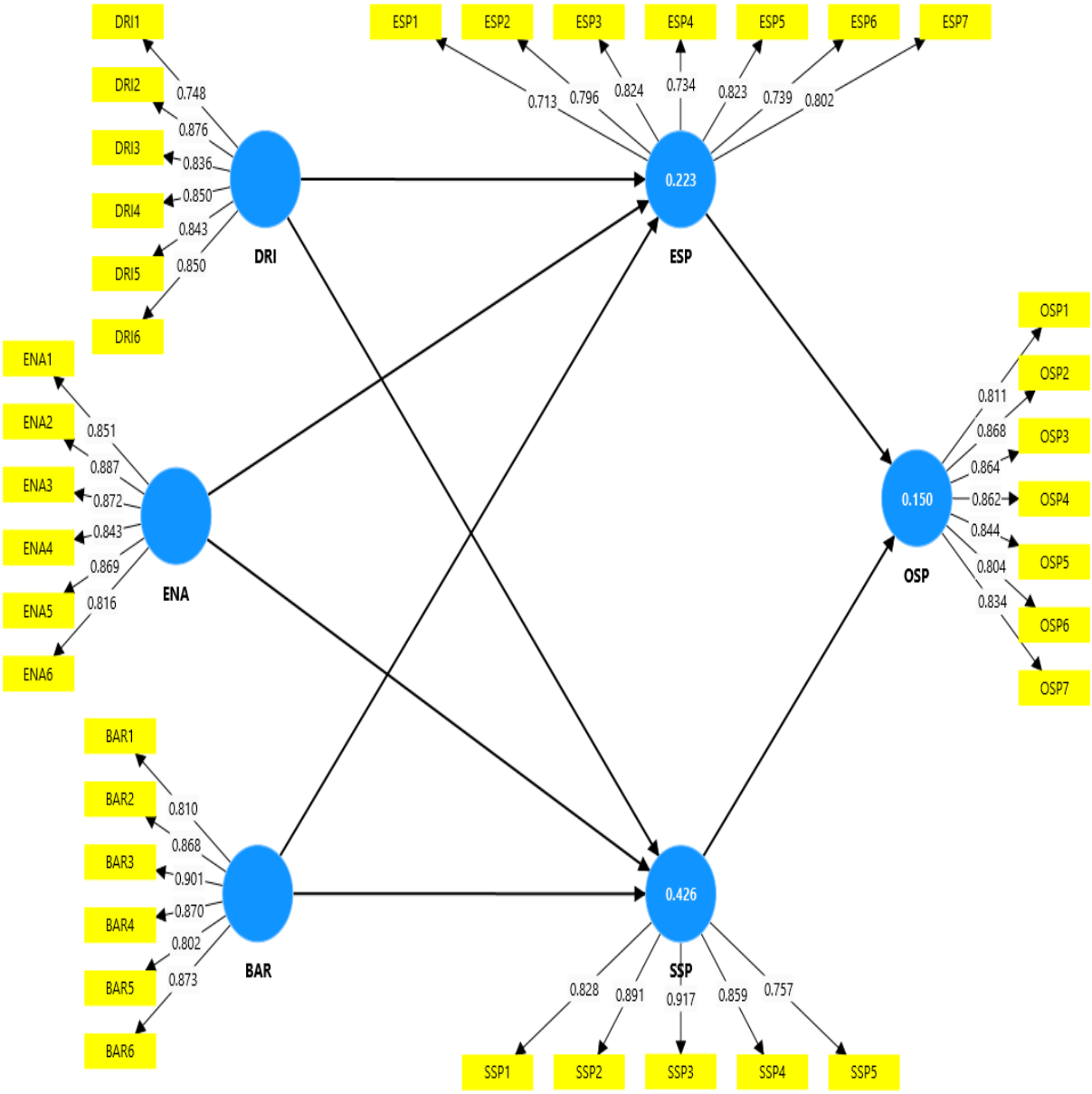


Figure 5.7: The PLS Path Model of the study
Source: author's screenshot from SmartPLS output

The conceptual framework of this study has six reflective latent constructs, namely, drivers (DRI), enablers (ENA), barriers (BAR), environmental sustainability practices (ESP), social sustainability practices (SSP), and outcomes of sustainability practices (OSP) with a reflective measurement model. Hence, for the reflective measurement models, the researcher needs to evaluate the estimates for the relationships between the reflective latent constructs and their corresponding indicators, that is the outer loadings of each indicator. As can be seen from Table 5.11 which displays the results for the outer loadings of all indicators, all the outer loadings of the reflective constructs DRI, ENA, BAR, ESP, SSP, and OSP are well above the threshold value of 0.708, which suggests sufficient levels of indicator reliability. It can be noted that the indicator SSP3 has the highest outer loading of 0.917 with an indicator explained variance value of 0.841, whereas, the indicator ESP1 has the smallest outer loading of 0.713 with indicator explained variance value of 0.508. Nevertheless, both values are above the recommended minimum value of 0.708 and 0.50 respectively. Table 5.11 displays the outer loading of all indicators under the six constructs of the study.

Table 5.11: Outer Loading Matrix

Constructs	DRI	ENA	BAR	ESP	SSP	OSP
DRI1	0.748					
DRI2	0.876					
DRI3	0.836					
DRI4	0.850					
DRI5	0.843					
DRI6	0.850					
ENA1		0.851				
ENA2		0.887				
ENA3		0.872				
ENA4		0.843				
ENA5		0.869				
ENA6		0.816				
BAR1			0.810			
BAR2			0.868			
BAR3			0.901			
BAR4			0.870			
BAR5			0.802			
BAR6			0.873			
ESP1				0.713		
ESP2				0.796		
ESP3				0.824		
ESP4				0.734		
ESP5				0.823		
ESP6				0.739		

ESP7				0.802		
SSP1					0.828	
SSP2					0.891	
SSP3					0.917	
SSP4					0.859	
SSP5					0.757	
OSP1						0.811
OSP2						0.868
OSP3						0.864
OSP4						0.862
OSP5						0.844
OSP6						0.804
OSP7						0.834

Source: author's own table based on SmartPLS output

5.6.2 Internal consistency reliability

The second criterion to be evaluated deals with internal consistency reliability. The commonly applied criterion for measuring internal consistency reliability is called Cronbach's alpha. This criterion offers an estimate of the reliability based on the intercorrelations of the observed indicator variables. However, one of the weaknesses of the Cronbach's alpha measure is that it assumes all indicators are equally reliable with equivalent outer loadings on the construct. Moreover, Cronbach's alpha is sensitive to the number of items in the scale and generally underrates the internal consistency reliability. Therefore, Cronbach's alpha criterion can be considered as a more conservative measure of internal consistency reliability. Due to the limitations of Cronbach's alpha, it is technically more suitable to apply a distinct measure of internal consistency reliability, known as composite reliability (rho_C).

Both the Cronbach's alpha and the composite reliability (rho_C) scores vary between 0 and 1, with higher values indicating higher levels of reliability. Specifically, values of 0.60 to 0.70 are acceptable in exploratory research, while in more advanced stages of research, values between 0.70 and 0.90 can be regarded as satisfactory (Hair et al., 2021). Furthermore, values above 0.90 and definitely more than 0.95 are not acceptable because they are typically the outcomes of semantically redundant items, which slightly rephrase the very same question. Finally, values below 0.60 indicate a lack of internal consistency and reliability. The Cronbach's alpha metric is conservative; however, the composite reliability measurement is considered excessively liberal. Therefore, the true reliability of a construct is typically viewed as in between these two extreme metrics. The rho_A reliability measure normally lies between

Cronbach's alpha and the composite reliability (rho_C), and is therefore believed as a good compromise between these two measurements (Hair et al., 2019).

Table 5.12: Construct validity and reliability

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
DRI	0.912	0.913	0.932
ENA	0.927	0.928	0.943
BAR	0.928	0.993	0.942
ESP	0.891	0.896	0.914
SSP	0.904	0.908	0.930
OSP	0.931	0.937	0.944

Source: author's own table based on SmartPLS output

Accordingly, to evaluate the reliability of the study's model construct measures, the researcher has examined the composite reliability output of the SmartPLS. The internal consistency reliability values as shown in Table 5.12 matrix format, the composite reliability (rho_A) values of 0.913 (DRI), 0.928 (ENA), 0.993 (BAR), 0.896 (ESP), 0.937 (SSP), and 0.908 (OSP) all six reflective constructs have high levels of internal consistency reliability. In addition, the bar chart in Figure 5.8 depicts the rho_A of the constructs' reliability values. If the rho_A value is above the threshold value, 0.70, the corresponding bar is colored green, however, if the rho_A value is lower than threshold values, the bar becomes red colored. As indicated above, all the rho_A values of the constructs of the model exceed the threshold.

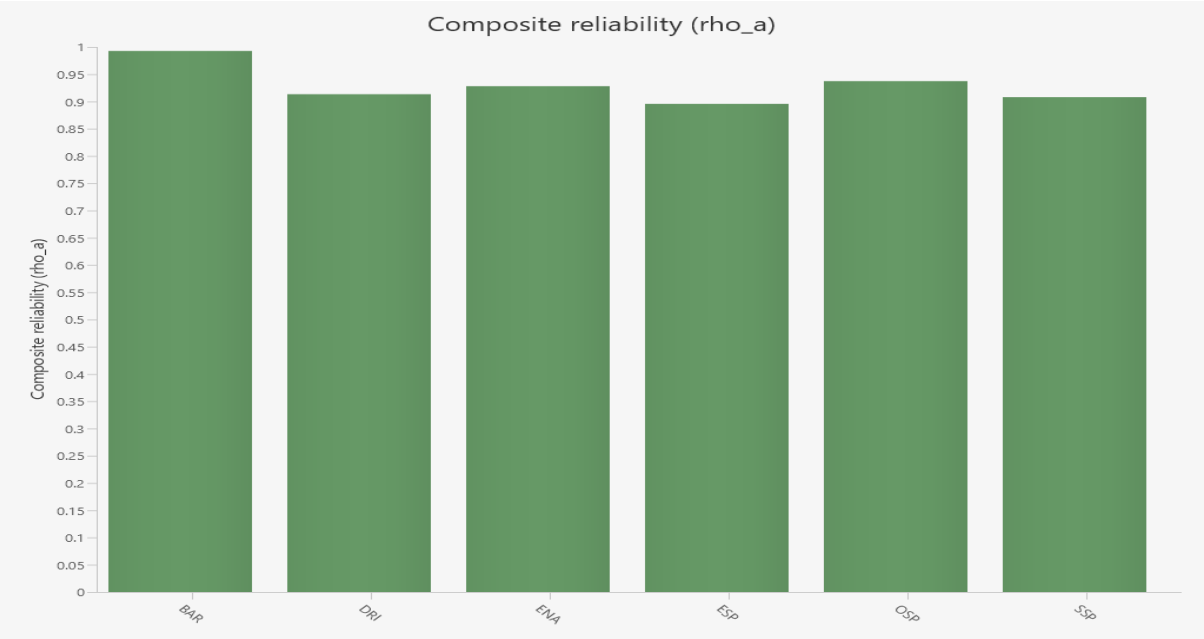


Figure 5.8: Composite reliability (rho_A) bar chart
Source: author's screenshot from SmartPLS output

Moreover, the Cronbach's alpha values of 0.912 for DRI, 0.912 for ENA, 0.928 for BAR, 0.891 for ESP, 0.904 for SSP, and 0.931 for OSP and the composite reliability (rho_C) scores of 0.932 for DRI, 0.943 for ENA, 0.942 for BAR, 0.914 for ESP, 0.930 for SSP and 0.944 for OSP, indicating that all construct measures are above the 0.70 threshold.

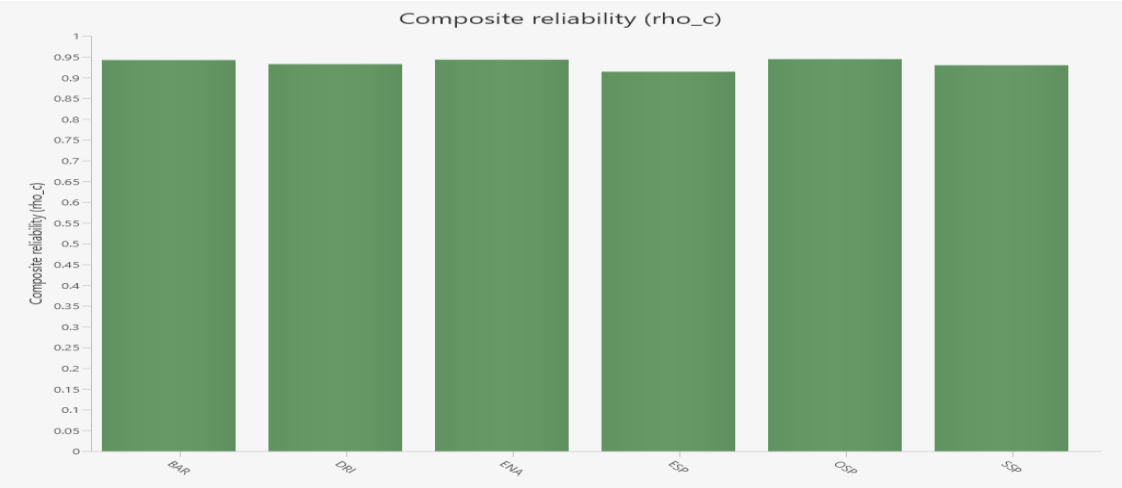


Figure 5.9: Composite reliability (rho_C) bar chart
Source: author's screenshot from SmartPLS output

Besides, as can be seen from Figures 5.8, 5.9, and 5.10, the bar charts of Cronbach's alpha, Composite reliability rho_A, and composite reliability rho_C values for all constructs show that all bars in the chart appear in green colour, indicating that all construct measures are above the 0.70 threshold. Therefore, based on the composite reliability (rho_A), composite reliability (rho_C) and Cronbach's alpha results, all the six constructs of the study's model have high reliability of construct measures.

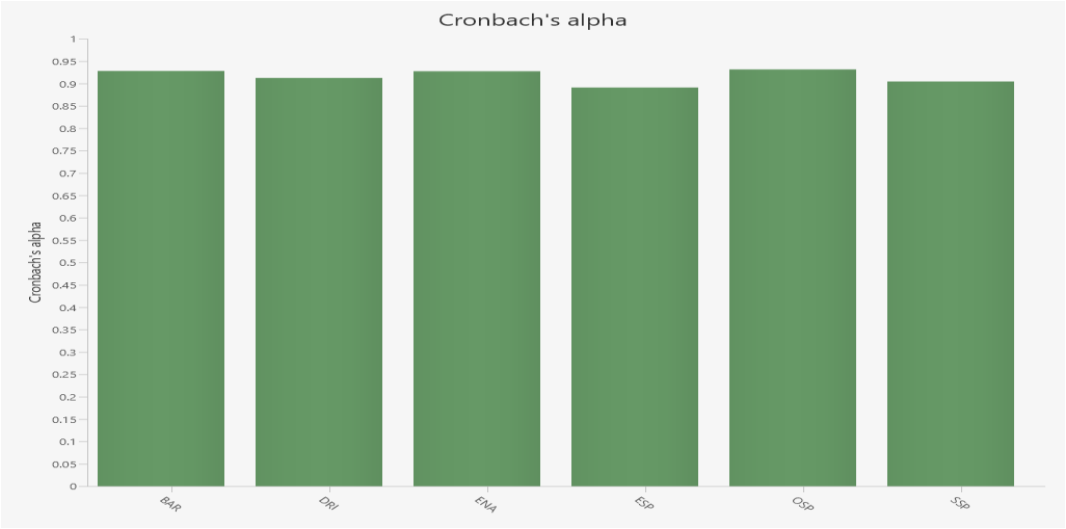


Figure 5.10: Cronbach's alpha bar chart
Source: author's screenshot from SmartPLS output

5.6.3 Convergent validity

Convergent validity is the degree to which an indicator correlates positively with the other indicators of the same construct. By applying the domain sampling model, indicators of a reflective construct are treated as alternative approaches to measure the same construct. Consequently, the indicators that are measures of a specific reflective construct should converge or share a high proportion of variance. The appropriate measure to establish convergent validity on the construct level is called the average variance extracted (AVE). This criterion is defined as the grand mean value of the squared loadings of the indicators associated with the construct i.e., the summation of the squared loadings divided by the number of indicators. Hence, the AVE is regarded as the equivalent to the communality of a construct. As per Hair et al. (2021), an AVE value of greater than or equal to 0.50 implies that, on average, the construct explains more than half of the variance of its indicators. On the other hand, an AVE score lower than 0.50 indicates that, on average, more variance remains in the error of the items than in the variance explained by the construct. Therefore, the AVE's size of each reflectively measured construct should be evaluated.

Table 5.13: Average variance extracted (AVE)

Construct	Average variance extracted (AVE)
DRI	0.697
ENA	0.734
BAR	0.731
ESP	0.604
SSP	0.726
OSP	0.708

Source: author's own table based on SmartPLS output

The convergent validity assessment of the model's constructs is made based on the average variance extracted (AVE) values which measures the internal consistency reliability. The SmartPLS application offers the options of displaying the results using a bar chart or in a table with matrix format. As shown in the matrix Table 5.13, the AVE values of 0.697 (DRI), 0.734 (ENA), 0.731 (BAR), 0.604 (ESP), 0.726 (SSP), and 0.708 (OSP), are significantly above the required minimum level of 0.50.

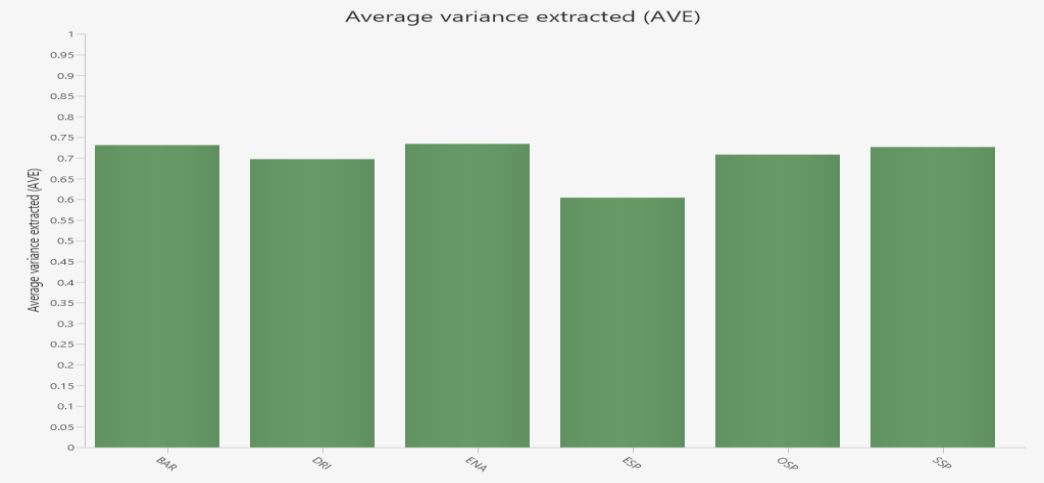


Figure 5.11: Average variance extracted bar chart
Source: author's screenshot from SmartPLS output

In addition, as can be seen from Figure 5.11, all the bar charts of the average variance extracted (AVE) values are displayed in green, which indicates all the constructs have an AVE value of more than the minimum range. Thus, the AVE values depicted in the matrix table and the bar charts indicate that the six reflective constructs have high levels of convergent validity.

5.6.4 Discriminant validity

Discriminant validity measures the degree to which a construct is distinct from the other constructs by empirical standards. Accordingly, ensuring a discriminant validity indicates that a construct is unique and captures an observable fact not represented by other constructs in the study's model. Conventionally, many researchers have relied on the Fornell-Larcker criterion to verify discriminant validity of a model's constructs (Fornell and Larcker, 1981). This criterion compares the square root of the AVE values with the latent variable correlations. Precisely, the square root of each construct's AVE should be greater than its highest correlation with any other construct in the model. The assumption behind the logic of the Fornell-Larcker criterion is based on the idea that a construct shares more variance with its associated indicators than with any other construct. The SmartPLS application offers several approaches to assess whether the construct measures empirically demonstrate discriminant validity. According to the Fornell-Larcker criterion (Fornell and Larcker, 1981), the square root of the AVE of each construct should be higher than the construct's highest correlation with any other construct in the model. This concept is identical to comparing the AVE with the squared correlations between the constructs of the study's structural equation model.

Table 5.14: Fornell and Larcker Criterion Matrix

	DRI	ENA	BAR	ESP	SSP	OSP
DRI	**0.835**					
ENA	0.173	**0.857**				
BAR	0.055	0.065	**0.855**			
ESP	0.449	0.145	0.158	**0.777**		
SSP	0.238	0.622	0.190	0.240	**0.852**	
OSP	0.461	0.159	0.027	0.384	0.138	**0.841**

Source: author's own table based on SmartPLS output

Table 5.14 portrays the outcomes of the Fornell-Larcker criterion calculation with the square root of the reflective constructs' AVE on the diagonal and the correlations between the constructs in the off-diagonal position. For instance, the reflective construct DRI has a value of 0.835 for the square root of its AVE, which needs to be compared with all correlation values in the column of DRI. Whereas, for the construct ENA, the researcher needs to consider the correlations in both the row and column, however, for OSP the researcher must consider only those in the row. Accordingly, the square roots of the AVEs for the six constructs DRI (0.835), ENA (0.857), BAR (0.855), ESP (0.777), SSP (0.852) and OSP (0.841) are all greater than the correlations of these constructs with other latent variables in the PLS path model, hence, the researcher has confirmed that all constructs are valid measures of unique concepts.

Table 5.15: Heterotrait–monotrait ratio (HTMT) Matrix

	DRI	ENA	BAR	ESP	SSP	OSP
DRI						
ENA	0.186					
BAR	0.090	0.101				
ESP	0.482	0.173	0.153			
SSP	0.261	0.678	0.198	0.257		
OSP	0.499	0.171	0.057	0.406	0.155	

Source: author's own table based on SmartPLS output

In addition to the Fornell Larcker criterion, the researcher has applied the Heterotrait-Monotrait ratio (HTMT) which is very reliable to detect discriminant validity problems of constructs. The Heterotrait-Monotrait ratio (HTMT) is the primary criterion for discriminant validity assessment which can be obtained from the discriminant validity section of the results report of the SmartPLS. Table 5.15 shows the HTMT values for all pairs of constructs of the study's model in a matrix format. The values presented in the table show that the HTMT values are vividly less than the recommended threshold level of 0.85 (Henseler, Ringle and Sarstedt, 2015).

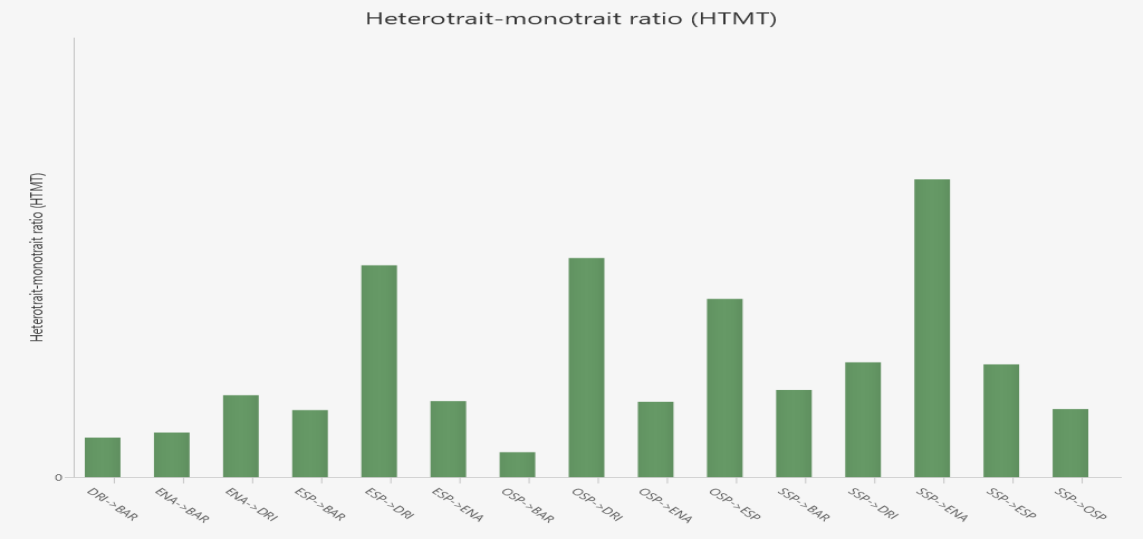


Figure 5.12: HTMT ratio value bar chart
Source: author's screenshot from SmartPLS

Furthermore, Figure 5.12 also shows these HTMT values in bar charts in green color, using 0.85 as the relevant threshold level. As can be seen, all the HTMT values are clearly lower than the more conservative threshold value of 0.85, for all the six constructs namely, DRI, ENA, BAR, ESP, SSP as well as OSP. Additionally, the assessment of discriminant validity of a measurement model can be undertaken by applying cross-loadings. As per this criterion, an indicator's outer loading on the associated construct should be greater than any of its cross-loadings on other constructs in the PLS SEM model.

As shown in Table 5.18, that presents the cross-loading values for each item under all the constructs in the study. The cross-loading value exhibit the loadings of each item under its underlying construct, which indicates the items under the parent construct can measure the latent variable. An item in a construct shall load substantially well onto its own underlying construct instead of the other constructs in the study. Hence, the other popular approach for establishing discriminant validity is the assessment of cross-loadings, which is also called "item-level discriminant validity." As per to Gefen and Straub (2005, p.92), discriminant validity can be described "discriminant validity is shown when each measurement item correlates weakly with all other constructs except for the one to which it is theoretically associated". Moreover, according to Mulaik (2009), the use of cross loadings to check discriminant validity can be traced back to exploratory factor analysis, where researchers routinely examine indicator loading patterns to identify indicators that have high loadings on the same factor and those that load highly on multiple factors. This approach enables the

researcher to identify items that are double or multiple loaders and exclude them from further considerations. Barclay, Higgins and Thompson (1995) and Chin (1998) were the pioneers to propose that the loading for each indicator should be greater than all of its cross-loadings in case of PLS. If not, "the measure in question is unable to discriminate as to whether it belongs to the construct it was intended to measure or to another i.e., discriminant validity problem"(Chin, 2009, p.671). Therefore, Henseler, Ringle and Sarstedt (2015) described that no additional theoretical arguments or empirical evidence of this approach's performance have been presented, an item should be highly correlated with its own construct, but have low correlations with other constructs in order to verify discriminant validity at the item level. Accordingly, as portrayed in Table 5.16, the indicators loading of all the six constructs of the study's conceptual framework illustrate that all the items under each parent construct load well than under other constructs which confirms discriminant validity at item level.

Table 5.16: Cross Loadings

	DRI	ENA	BAR	ESP	SSP	OSP
DRI1	**0.748**	0.141	-0.072	0.366	0.194	0.381
DRI2	**0.876**	0.158	0.122	0.378	0.219	0.403
DRI3	**0.836**	0.110	0.048	0.376	0.174	0.404
DRI4	**0.850**	0.153	0.040	0.400	0.204	0.442
DRI5	**0.843**	0.166	0.086	0.355	0.205	0.332
DRI6	**0.850**	0.137	0.049	0.371	0.197	0.338
ENA1	0.182	**0.851**	-0.046	0.131	0.539	0.184
ENA2	0.187	**0.887**	0.043	0.076	0.543	0.146
ENA3	0.145	**0.872**	-0.020	0.108	0.548	0.140
ENA4	0.097	**0.843**	0.079	0.068	0.494	0.098
ENA5	0.110	**0.869**	0.128	0.147	0.523	0.121
ENA6	0.161	**0.816**	0.150	0.206	0.545	0.123
BAR1	0.028	0.040	**0.810**	0.128	0.098	-0.002
BAR2	0.026	0.015	**0.868**	0.051	0.128	-0.013
BAR3	0.078	0.127	**0.901**	0.191	0.217	0.049
BAR4	0.043	0.039	**0.870**	0.090	0.111	0.026
BAR5	-0.047	0.016	**0.802**	0.053	0.146	0.015
BAR6	0.089	0.040	**0.873**	0.193	0.198	0.030
ESP1	0.075	0.003	0.003	**0.713**	0.275	0.069
ESP2	0.067	0.080	0.080	**0.796**	0.254	0.128
ESP3	0.135	0.040	0.040	**0.824**	0.256	0.132
ESP4	0.139	0.007	0.007	**0.734**	0.264	0.123
ESP5	0.221	0.201	0.201	**0.823**	0.324	0.291
ESP6	0.090	0.243	0.243	**0.739**	0.347	0.248
ESP7	0.123	0.148	0.148	**0.802**	0.331	0.259
SSP1	0.195	0.513	0.189	0.252	**0.828**	0.114
SSP2	0.205	0.599	0.147	0.180	**0.891**	0.099

SSP3	0.266	0.530	0.179	0.246	**0.917**	0.098
SSP4	0.236	0.478	0.251	0.258	**0.859**	0.084
SSP5	0.107	0.524	0.042	0.088	**0.757**	0.200
OSP1	0.425	0.106	0.053	0.377	0.068	**0.811**
OSP2	0.393	0.135	0.025	0.287	0.129	**0.868**
OSP3	0.367	0.107	-0.003	0.386	0.093	**0.864**
OSP4	0.371	0.150	0.055	0.327	0.122	**0.862**
OSP5	0.400	0.112	-0.035	0.260	0.088	**0.844**
OSP6	0.398	0.166	-0.016	0.284	0.196	**0.804**
OSP7	0.358	0.168	0.068	0.305	0.132	**0.834**

Source: author's own table based on SmartPLS output

5.7 Structural model evaluation

The evaluation of the structural model results comes next, following confirmation that the constructs are reliably and validly measured. The first thing a researcher should do is look for any possible collinearity problems in the structural model. Figure 5.13 depicts the structural model of the study.

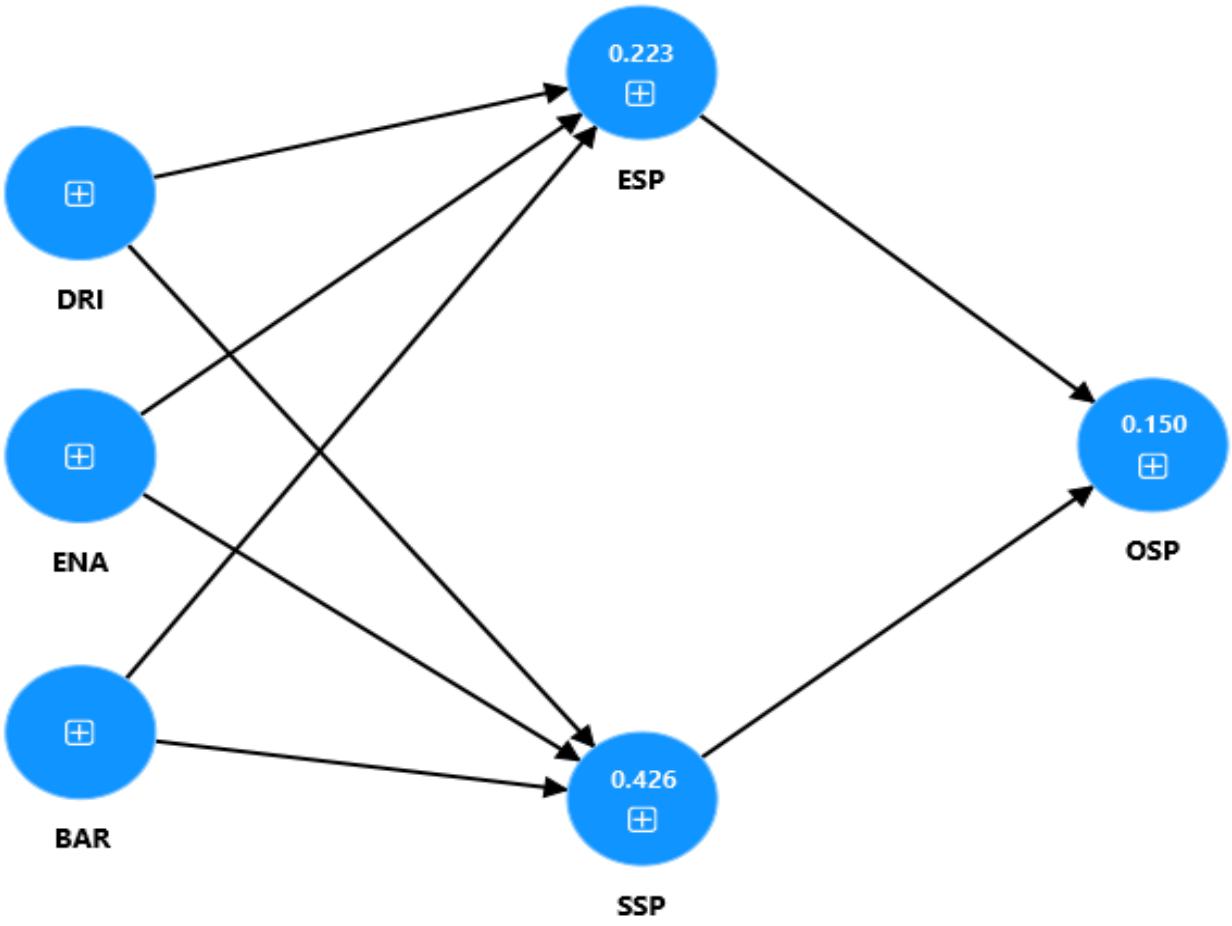


Figure 5.13: The structural model of the study
Source: author's screenshot from SmartPLS

After the researcher has confirmed that the measurement of the study model constructs is reliable and valid, the subsequent step undertakes the evaluation of the structural model results. The first step in the evaluation of the structural model deals with the examination of the structural model for potential collinearity problems. The rationale behind the examination of the collinearity issues is that the estimation of path coefficients in the structural models is based on ordinary least squares (OLS) regressions of each endogenous construct on its corresponding predictor constructs. Like an OLS regression, the path coefficients might be biased if the estimation includes high levels of collinearity amongst predictor constructs. After the researcher has ensured that collinearity is not an issue in the structural model, the second step is concerned with the evaluation of the significance and relevance of the structural model relationships. The third step of the procedure deals with the examination of the study model's explanatory power. Finally, the fourth step of the structural model involves the assessment of predictive power.

5.7.1 Assessment of collinearity issues of the structural model

In the first part of this chapter, the researcher has focused on the evaluation of the measurement models, now the researcher deals with the structural model which describes the relationships between constructs. Hence, as per the structural model assessment procedure and the researcher begins with the evaluation of the collinearity of predictor constructs in relation to each endogenous construct. The structure model of the study has three endogenous constructs, namely, environmental sustainability practices (ESP), social sustainability practices (SSP), and outcomes of sustainability practices (OSP). The researcher has examined the VIF scores of the predictor indicators by inspecting the collinearity statistics the inner model. Five predictor constructs are assessed for collinearity issues in this study. Specifically, drivers (DRI), enablers (ENA), and barriers (BAR) are used as predictors of the environmental sustainability practices (ESP), social sustainability practices (SSP), and outcomes of sustainability practices (OSP). In addition, environmental sustainability practices (ESP) and social sustainability practices (SSP) as predictors of outcomes of sustainability practices (OSP). Note that the constructs environmental sustainability practices (ESP) and social sustainability practices (SSP) are considered as predictor and endogenous constructs.

Table 5.17: Collinearity Statistics (VIF) - Inner Model List

Predictor Constructs	Endogenous Constructs	VIF	
Drivers (DRI)	Environmental Sustainability Practices (ESP)	DRI -> ESP	1.033
Enablers (ENA)		ENA -> ESP	1.034
Barriers (BAR)		BAR -> ESP	1.006
Drivers (DRI)	Social Sustainability Practices (SSP)	DRI -> SSP	1.033
Enablers (ENA)		ENA -> SSP	1.034
Barriers (BAR)		BAR -> SSP	1.006
Environmental Sustainability Practices (ESP)	Outcomes of Sustainability Practices (OSP)	ESP -> OSP	1.061
Social Sustainability Practices (SSP)		SSP -> OSP	1.061

Source: author's own table based on SmartPLS output

As can be seen from Table 5.17, all the VIF values are clearly below the recommended threshold of 5. Therefore, it is safe to conclude that collinearity among predictor constructs is not a critical issue in the structural model of this study.

5.7.2 Assessment of the significance and relevance

The second step in the structural model assessment procedure is to evaluate the relevance and significance of the structural paths. The significance and relevance assessment employs bootstrapping standard errors to calculate path coefficient t-values, or alternatively, confidence intervals (Streukens and Leroi-Werelds, 2016). The bootstrapping procedure in PLS-SEM investigates the stability and importance of various coefficients such as outer weights, outer loading, and path coefficients based on resampling subsamples with replacement from the original sample. The setting of the bootstrapping procedure to evaluate the relevance and significance of the structural paths for this study is shown in Table 5.18.

Table 5.18: Summary of the bootstrapping procedure of the study

	Setting
Complexity	Complete (slower)
Confidence interval method	Bias-corrected and accelerated (BCa) bootstrap
Parallel processing	Yes
Samples	10000
Save results per sample	No
Seed	Random seed
Significance level	0.05
Test type	Two tailed

Source: author's own table based on SmartPLS output

Accordingly, the bootstrapping procedure is run, and the outputs of structural paths can be seen from Table 5.19. First, let's consider the original path coefficient sample estimates for the exogenous constructs of the study, namely, drivers (DRI), enablers (ENA), barriers (BAR),

environmental sustainability practices (ESP), and social sustainability practices (SSP). As per the path coefficient estimates analysis result, the researcher has found out that the exogenous construct enablers have a very strong positive impact on social sustainability practices (β= 0.591). The constructs drivers and environmental sustainability practices have a strong positive impact on environmental sustainability practices (β=0.431) and the outcomes of sustainability practices (β=0.373) respectively. Whereas drivers on social sustainability practices (β=0.228), enablers on environmental sustainability practices (β=0.262), and social sustainability practices on outcomes of sustainability practices (β=0.249) have weak positive impact. On other hand, the exogenous construct barriers have a weak negative impact on environmental sustainability practices (β= -0.231), and social sustainability practices (β= -0.244).

Table 5.19: Path coefficients significance and relevance

Relationships	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DRI -> ESP	0.431	0.430	0.062	6.918	0.000
DRI -> SSP	0.228	0.227	0.061	2.617	0.014
ENA -> ESP	0.262	0.264	0.065	2.730	0.007
ENA -> SSP	0.591	0.592	0.045	13.048	0.000
BAR -> ESP	-0.231	0.237	0.060	2.672	0.010
BAR -> SSP	-0.244	0.249	0.052	2.772	0.008
ESP -> OSP	0.373	0.384	0.059	6.337	0.000
SSP -> OSP	0.249	0.252	0.062	2.781	0.005

Source: author's own table based on SmartPLS output

Next, the researcher looks at the results for statistical significance results assuming a 5% significance level as specified with the parameter alpha = 0.05 in the bootstrapping model function. The estimated t-values from the bootstrapping procedure should be greater than the threshold value of 1.960. Hence, the researcher has find out that the estimated t-values for all the exogenous construct relationships, DRI -> ESP, t = 6.918; DRI -> SSP, t = 2.617; ENA -> ESP, t = 2.730; ENA -> SSP, t = 13.048; BAR -> ESP, t = 2.672; BAR -> SSP, t = 2.772; ESP -> OSP, t = 6.337; and SSP -> OSP, t = 2.781, are significant. Therefore, the statistical significance of the path coefficients for all the endogenous construct relationships are statistically significant.

5.7.3 Assessment of the model's explanatory power

The third step of the structural model assessment procedure is concerned with the determination of the model's explanatory power by analyzing the R square values of the

endogenous constructs and the f square effect size of the predictor constructs. First, the researcher has examined the R square values of the endogenous constructs of the study's model. The coefficient of determination, R square which measures the predictive power of the model. Therefore, R square values of endogenous constructs of the model are presented in Table 5.20 to evaluate the predictive power of the model. According to Falk and Miller (1992) the R square values should be greater than or equal to 0.10 in order for the variance explained of a specific endogenous construct to be considered adequate. Additionally, as per Chin (1998) R square values of 0.67, 0.33, and 0.19 are generally regarded in various social scientific disciplines as substantial, moderate, and weak, respectively. As can be seen from Table 5.20, the R square score for the endogenous construct social sustainability practices, SSP (0.426) is moderate whereas the R square values for the environmental sustainability practices, ESP (0.223), and outcomes of sustainability practices, OSP (0.150) are weak.

Table 5.20: R square values

Endogenous Constructs	**R square**	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
Environmental Sustainability Practices (ESP)	0.223	0.242	0.052	4.265	0.000
Social Sustainability Practices (SSP)	0.426	0.438	0.058	7.319	0.000
Outcomes of Sustainability Practices (OSP)	0.150	0.166	0.045	3.352	0.001

Source: author's own table based on SmartPLS output

An endogenous construct in a structural equation model may be affected by several different variations. For example, removing an exogenous variable can affect the endogenous construct. F-square is the change in R-square when an exogenous variable is removed from the model. Researchers can examine how the elimination of a particular predictor construct influences an endogenous construct's R square value (Hair et al., 2019). As a rule of thumb, values greater than 0.02, 0.15 and 0.35 portray small, medium and large f square effect sizes (Cohen, 2013). Table 5.21 shows the F square values for all combinations of exogenous (i.e., predictor) constructs and corresponding endogenous constructs.

Table 5.21: F square values

	F square	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DRI -> ESP	0.431	0.243	0.083	2.797	0.000
DRI -> SSP	0.228	0.249	0.129	2.953	0.014
ENA -> ESP	0.262	0.254	0.120	2.243	0.008
ENA -> SSP	0.588	0.612	0.143	4.113	0.000
BAR -> ESP	- 0.231	0.339	0.083	2.957	0.010
BAR -> SSP	- 0.244	0.245	0.079	2.244	0.008
ESP -> OSP	0.373	0.273	0.062	2.499	0.000
SSP -> OSP	0.249	0.287	0.069	2.283	0.005

Source: author's own table based on SmartPLS output

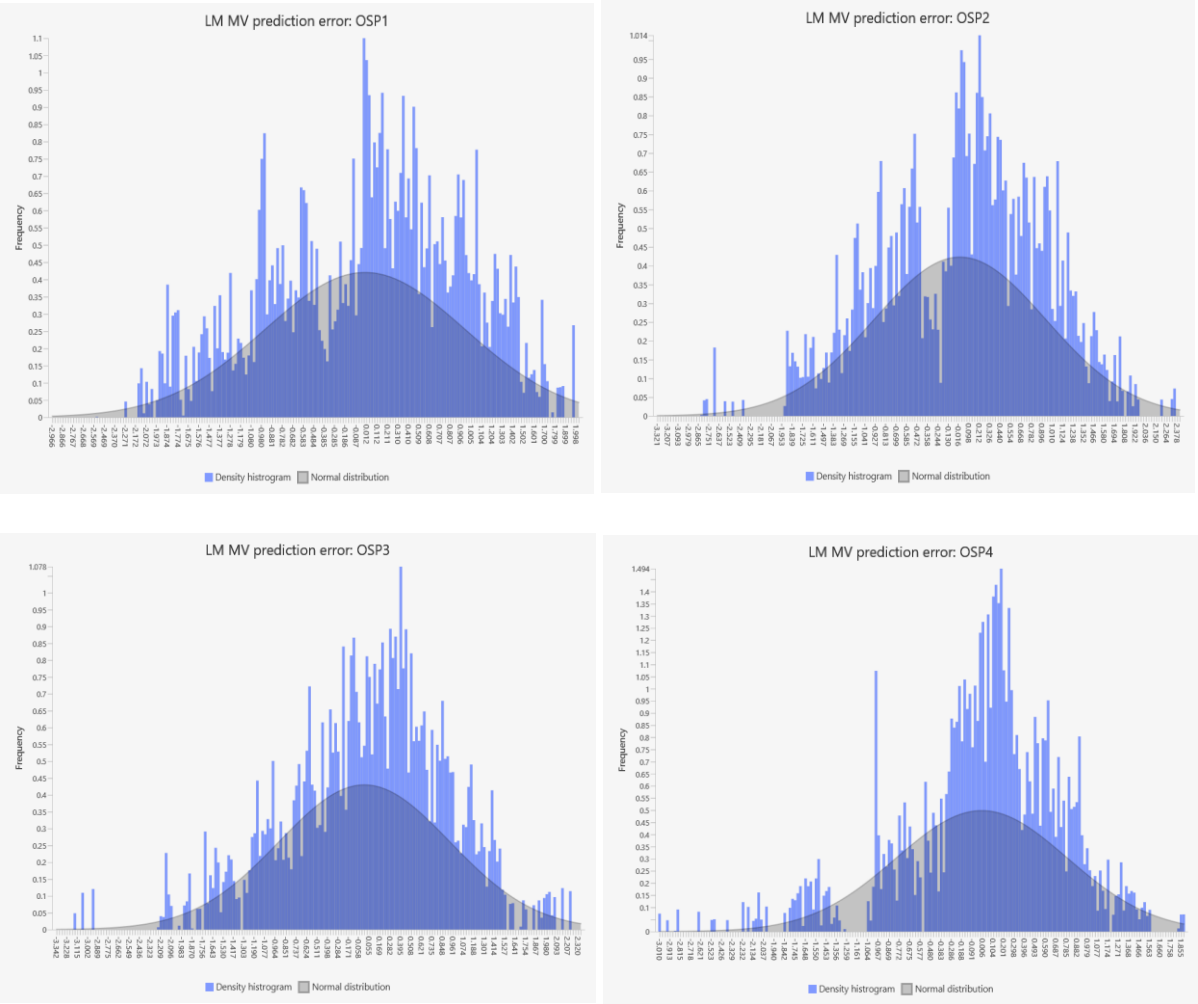
The predictor construct enablers (ENA) have a very large effect size of 0.588 on the endogenous construct social sustainability practices (SSP), but it has a moderate effect size of 0.262 on environmental sustainability practices (ESP). Moreover, the exogeneous construct drivers (DRI) have moderate effect sizes of 0.431 on environmental sustainability practices (ESP) and 0.228 on social sustainability practices. Similarly, the predictor construct barriers have moderate effect sizes of - 0.231 on environmental sustainability practices (ESP) and - 0.244 on social sustainability practices (SSP). The exogenous constructs environmental sustainability practices (ESP) and social sustainability practices (SSP) have moderate effect sizes of 0.373 and 0.249 on the endogenous construct outcomes of sustainability practices respectively. From this analysis the researcher has understood that the f square effect sizes are found to be large and moderate, which statistically proves the effect of exogenous constructs on their corresponding endogenous constructs of the study's model. That means, there are no exogenous constructs in the model which do not have an effect on their corresponding endogenous constructs.

5.7.4 Assessment of the model's predictive power

The next step in the structural model assessment procedure is the evaluation of the model's predictive power. To determine the predictive power of the model, the researcher first must generate the predictions using the PLSpredict function of the SmartPLS 4.0 software tool. Hence, the researcher has run the PLSpredict with a setting of ten reptations, ten folds and fixed seeds. The distributions of the prediction errors need to be assessed to decide the best metric for evaluating predictive power. On most occasions, researchers should use the root mean squared error (RSME) to examine the predictive power of a study model. Nonetheless,

if the prediction error distribution is non symmetric, as demonstrated in a long right or left tail in the plot of distribution of prediction error, the mean absolute error (MAE) is the more prediction statistic (Danks and Ray, 2018; Shmueli et al., 2019).

While analyzing PLSpredict outcomes, researchers should generally focus on the study model's key endogenous construct, instead of examining the prediction errors in all of the endogenous constructs' indicators (Shmueli et al., 2019). Therefore, the researcher focused on the key endogenous construct outcomes of sustainability practices (OSP) and evaluate all the seven indicators, specifically OSP1, OSP2, OSP3, OSP4, OSP5, OSP6, and OSP7. The results shown in Figure 5.14 depicts that all the seven plots have left tail, appear slightly skewed to right, nevertheless, the prediction errors distributions are symmetric. Therefore, the researcher has chosen to use RMSE for our assessment of prediction errors of the study's model.



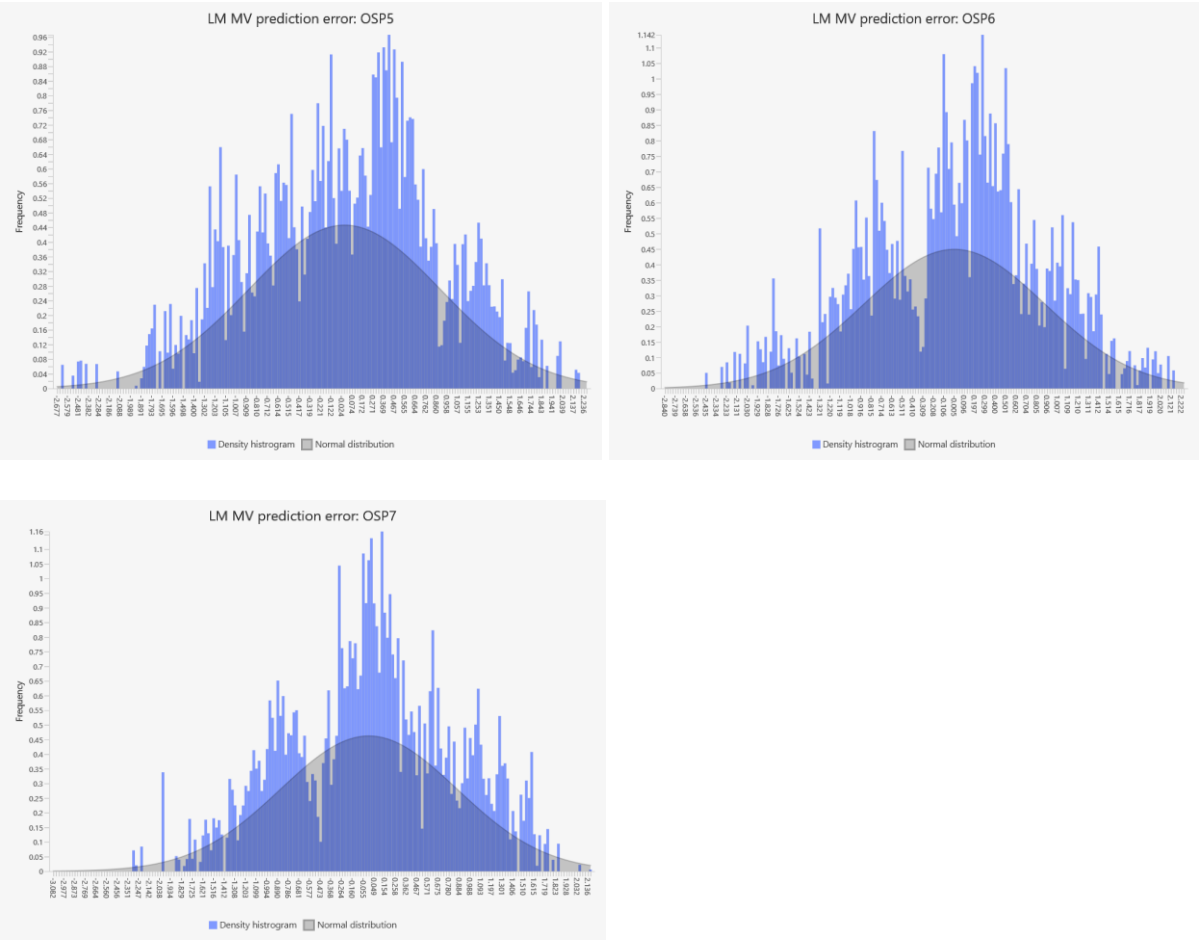


Figure 5.14: Distribution of prediction error for indicators
Source: author's screenshot from SmartPLS

To interpret predictive power metrics, researchers need to compare each indicator's RMSE (or MAE) values with a naive LM benchmark (Hair et al., 2021). The linear regression mode (LM) benchmark values are determined by running a linear regression of each of the endogenous construct's indicators on the indicators of the exogenous constructs in the PLS path model (Danks and Ray, 2018). In contrasting the RMSE or MAE values with the LM values, the following guidelines apply (Shmueli et al., 2019):

1. If all indicators in the PLS-SEM analysis have lower RMSE or MAE values compared to the naive LM benchmark, the model has high predictive power.

2. If the majority of indicators in the PLS-SEM analysis yields smaller prediction errors compared to the LM, this indicates a medium predictive power.

3. If a minority of the dependent construct's indicators produce lower PLS-SEM prediction errors compared to the naive LM benchmark, this indicates the model has low predictive power.

4. If the PLS-SEM analysis as compared to the LM yields lower prediction errors in terms of the RMSE (or the MAE) for none of the indicators, this indicates the model lacks predictive power.

As a result, the researcher found that the PLS path model has lower predictive error (RMSE) as compared to the naive LM model benchmark for all seven indicators, i.e., OSP1 (PLS RSME, 0.921; LM RSME, 0.949) OSP2 (PLS RSME, 0.883; LM RSME, 0.943), OSP3 (PLS RSME, 0.879; LM RSME, 0.928), OSP4 (PLS RSME, 0.752; LM RSME, 0.801), OSP5 (PLS RSME, 0.866; LM RSME, 0.894), OSP6 (PLS RSME, 0.861; LM RSME, 0.888), and OSP7 (PLS RSME, 0.822; LM RSME, 0.863). Accordingly, the researcher can understand and conclude that the study's model has a high predictive power.

Table 5.22: PLSpredict summary

Endogenous Constructs' Indicators	Q^2 predict	PLS-SEM_RMSE	LM_RMSE
ESP1	0.160	0.683	0.680
ESP2	0.042	0.715	0.722
ESP3	0.027	0.729	0.750
ESP4	0.048	0.763	0.762
ESP5	0.148	0.712	0.732
ESP6	0.135	0.797	0.829
ESP7	0.126	0.753	0.778
SSP1	0.275	0.709	0.752
SSP2	0.353	0.667	0.714
SSP3	0.302	0.663	0.714
SSP4	0.263	0.670	0.720
SSP5	0.235	0.677	0.699
OSP1	0.095	0.921	0.949
OSP2	0.093	0.883	0.943
OSP3	0.076	0.879	0.928
OSP4	0.089	0.752	0.801
OSP5	0.086	0.866	0.894
OSP6	0.087	0.861	0.888
OSP7	0.086	0.822	0.863

Source: authors' own table based on SmartPLS output

Moreover, researchers can apply another means to evaluate the PLS path model's predictive accuracy by calculating the Q square value (Geisser, 1974; Stone, 1974). As a guideline, Q square values should be larger than zero for a specific endogenous construct to indicate predictive accuracy of the structural model for that construct. As a rule of thumb, Q square values greater than 0, 0.25 and 0.50 illustrate small, medium and large predictive relevance

of the PLS-path model (Hair et al., 2019). Additionally, Shmueli et al. (2016) suggested using the simple indicator-level average as a naïve benchmark. This naïve benchmark is referred to as Q square predict which uses the mean value of the variables in sample as predictions of the variables in the holdout sample. A positive Q square predict value indicates that the PLS path model's prediction error is smaller than the prediction error given by the naïve benchmark (Hair et al., 2019). As can be seen from Table 5.22, all the indicators of the endogenous constructs of the study's model have Q square predict values significantly greater than zero. Therefore, this indicates that the PLS path model of the study has an acceptable predictive accuracy.

The concept of model fit, as defined and commonly used in CB-SEM, does not effectively work for PLS-SEM method. So far efforts to introduce model fit measures in PLS-SEM have generally proven unsuccessful (Hair et al., 2022b). Therefore, it is recommended to apply measurement models and structural model evaluation when using PLS-SEM. Accordingly, the measurement models of this study is assessed on the grounds of indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. In addition, the evaluation of the structural model is undertaken by checking collinearity among sets of predictor constructs, the significance and relevance of path coefficients, and criteria to assess the model's in-sample that is the explanatory power and out-of-sample predictive power ($PLS_{predict}$).

5.8 Chapter summary

The findings for the data analysis have been provided in this chapter. After addressing the pilot testing of the questionnaire and data administration procedures in the first step, the data distribution was statistically evaluated, readying the data for statistical analysis. Then, the chapter has covered data quality issues in general, including validity and dependability, proving the accuracy and legitimacy of the findings. Additionally, to ascertain statistically whether the measuring items accurately reflect the measures they are connected with, exploratory factor analysis (EFA) has been performed. The carrying out of EFA resulted in the removal of the three items, i.e., SSP3, OSP8, and OSP9, which confirmed the convergent validity. This chapter has presented the outcomes of the evaluation of the measurement model of the study, which includes an assessment of indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Moreover, the chapter also provides the structural model evaluation results, which encompass the assessment of collinearity

issues of the structural model, assessment of the significance and relevance, assessment of the model's explanatory power, and assessment of the model's predictive power. The results relating to the fit of the proposed research model supported the claim of good model fit, indicating that the theorized model statistically fit with the real data collected from the survey.The outcome of hypothesis testing showed that all the eight research hypotheses were supported, offering novel research findings.

CHAPTER SIX: DISCUSSION OF RESULTS

6.1 Overview

The purpose of this chapter is to discuss and report the findings derived from the analysis and results in the preceding chapter. The chapter begins with a review of the theoretical perspectives on the critical factors, implementation of SSCM practices, and outcomes of SSCM practices this study has generated. Then, the results of the hypothesis testing referring to the proposed conceptual framework of the study and a discussion of whether a discovery has been made in line with the current body of knowledge is discussed. After that, it provides a more thorough analysis of the critical factors that led to the adoption of SSCM practices based on the results of causal relationship testing. The research findings about the theoretical relationships between implementing SSCM practices and the corresponding performance outcomes are then covered in detail, which also presents the new theoretical perspectives on SSCM practices and performance outcomes that resulted from this analysis. Moreover, the chapter provides a brief overview of the discussions of the research findings that provide new insights into the state of the art in the field of SSCM. Finally, this chapter concludes with a summary.

6.2 Theoretical perspectives of the research of themes

This section discusses briefly the theoretical overview of the research themes of the study by referring to the results of the data analysis. Moreover, the section also discusses hypotheses test results based on the structural model analysis and the statistical support for the research hypotheses. The conceptual framework comprises three research themes that are critical factors, adoption of SSCM practices, and performance outcomes represented by six constructs labelled as drivers, enablers, barriers, environmental sustainability practices, social sustainability practices, and performance outcomes of sustainability practices. Hence, the proposed conceptual framework of the research is believed to be a comprehensive framework that depicts the theoretical relationships between the constructs of the study. The empirical findings of the study exhibit positive and significant relationships between the drivers and enablers of SSCM and implementation of SSCM practices from the perspectives of the Ethiopian coffee supply chain. However, the empirical results show a negative and significant relationship between the barriers to adopting SSCM and the implantation of SSCM practices. Thus, the drivers and enablers are crucial antecedents to the successful

implementation of environmental and social sustainability practices. However, the barriers are obstacles to effectively implementing sustainability initiatives; thus, organizations need to identify and overcome the relevant barriers. In addition, the relationship between implementation of environmental and social sustainability practices and performance outcomes is confirmed to be positive and significant.

In the absence of the drivers of SSCM such as economic and productivity improvement, competitive advantage, social well-being and social responsibility, reputation and brand image enhancement, supportive organizational culture, and adopting an innovative business model, firms in the Ethiopian coffee supply chain will not engage in the adoption of SSCM initiatives. Moreover, without the existence of enablers to adopt SSCM activities, which encompass factors like cost effectiveness and improvements in overall performance, joint effort for planning and capacity building, understanding customer and stakeholder requirements, monitoring and auditing the ongoing supply chain activities, understanding the sustainability initiative's importance and benefits, and resource allocation and information sharing within and across organizations, it would be difficult for the firms to successfully implement SSCM initiatives. However, the presence of barriers to adopting SSCM practices, for instance, difficulty in mindset and cultural changes, lack of proper technology and infrastructure, lack of top and middle management support, lack of government support, high financial costs and lack of resources, and communication gaps and inadequate collaboration between parties pose challenges on firms engaged in implementing SSCM initiatives.

On the other hand, the findings concerning the relationship between the implementation of SSCM practices and performance outcomes of sustainability practices are explained in terms of environmental, social, and economic performance indicators. The empirical findings show that the implementation of environmental and social sustainability practices results in performance outcomes of sustainability. Specifically, the implementation of environmental sustainability practices has a positive and significant association with the environmental, social, and economic performance outcomes of sustainability practices. Besides, the adoption of social sustainability practices has a positive and significant relationship with the environmental, social, and economic performance outcomes of sustainability practices. The environmental performance outcomes include reduction in solid and water waste, reduction of environmental accidents, and decrease in consumption of hazardous toxic materials. The social sustainability performance outcomes cover improvement of company images,

enhancement of corporate images as an ethical organization, and improved employee or community health and safety. The economic performance outcome is explained in terms of the increase in sales of products, and in this case, an improvement in the sales of coffee. These findings are expected to make significant contributions to the existing literature in the field of SSCM from the perspectives of coffee producers and suppliers in developing countries. Thus, this research is supposed to offer new insights and research directions concerning the adoption of SSCM practices and the resulting performance considering the critical factors that determine adoption of sustainability initiatives.

6.2.1 Critical factors to adopt SSCM practices

To craft and propose a comprehensive conceptual framework of the study the main task was to identify the critical factors that determine the adoption of SSCM initiatives in the Ethiopian coffee supply chain. Hence, to gain a holistic overview of the critical factors that affect the adoption of SSCM practices, an array of literature sources were explored generally in the SSCM field of study and especially in the area of sustainable agrifood supply chain management. The thematic analysis of the existing literature designated that the critical factors that determine the adoption of SSCM practices can be clustered into three constructs, namely, the drivers, enablers, and barriers. The construct drivers of SSCM encompasses economic and productivity improvement (Zimon, Tyan and Sroufe, 2020; Adams, Donovan and Topple, 2023), competitive advantage (Saeed and Kersten, 2019; Nguyen et al., 2023), social well-being and social responsibility (Govindan, 2018; Ouro-Salim and Guarnieri, 2023), reputation and brand image enhancement (Golini et al., 2017; Mohseni, Baghizadeh and Pahl, 2022), supportive organizational culture (Jia et al., 2018; Mehmood et al., 2021), and adopting an innovative business model (Luthra et al., 2020; Guimarães et al., 2022). The construct enablers of SSCM practices comprises cost effectiveness and improvements in overall performance (Luthra et al., 2020; Elhidaoui and Kota, 2023), joint efforts, planning and capacity building (Elhidaoui and Kota, 2023; Hidayati, Garnevska and Childerhouse, 2023), understanding customer and stakeholder requirements (Mangla et al., 2018; Mani and Gunasekaran, 2018), monitoring and auditing the ongoing supply chain activities (Mangla et al., 2018; Elhidaoui and Kota, 2023), understanding the sustainability initiative's importance and benefits (Akhtar et al., 2016; Elhidaoui and Kota, 2023), and resources allocation and information sharing within and across organizations (Mangla et al., 2018; Mastos and Gotzamani, 2022). Moreover, the construct barriers to adopt SSCM practices covers factors

such as difficulty in mindset and cultural changes (Adams, Donovan and Topple, 2023; Ouro-Salim and Guarnieri, 2023), lack of proper technology and infrastructure (Ghadge et al., 2021; Mehmood et al., 2021), lack of top and middle management support (Mastos and Gotzamani, 2022; Mohseni, Baghizadeh and Pahl, 2022), lack of government support (Agyemang et al., 2018; Govindan, 2018), high financial costs and lack of resources (Elhidaoui and Kota, 2023; Ouro-Salim and Guarnieri, 2023), and communication gaps and inadequate collaboration between parties (Govindan, 2018; Ouro-Salim and Guarnieri, 2023).

6.2.2 The SSCM practices

The subsequent task in developing the conceptual framework was to elucidate the SSCM practices that could be applied to implement sustainability initiatives in the Ethiopian coffee industry. As per the thematic literature analysis the SSCM practices are categorized into three dimensions, and these are environmental, social, and economic sustainability practices. However, considering the scope of the study, the conceptual framework includes two constructs of SSCM practices, that are the environmental and social sustainability practices. Thus, the environmental sustainability practices construct includes sustainable process design (Rao, 2004; Mitra and Datta, 2014), minimization of waste (Rao and Holt, 2005; Baliga, Raut and Kamble, 2019), improvements of packaging (Zailani et al., 2012; García-Arca, Prado-Prado and Garrido, 2014), environmentally responsible purchasing (Vachon and Klassen, 2006; Baliga, Raut and Kamble, 2019), green and reverse logistics (García-Arca, Prado-Prado and Garrido, 2014; Mitra and Datta, 2014), customer sustainability information (Vachon and Klassen, 2006; Baliga, Raut and Kamble, 2019), and environmental certification (Hoejmose and Adrien-Kirby, 2012; Baliga, Raut and Kamble, 2019). The social sustainability practices construct covers human rights (Shafiq et al., 2014; Mani et al., 2016), safety and health (Longo, Mura and Bonoli, 2005; Ahi and Searcy, 2015b), equality and ethics (Shafiq et al., 2014; Mani et al., 2016), philanthropy and social welfare (Shafiq et al., 2014; Baliga, Raut and Kamble, 2019), socially responsible purchasing (Mani et al., 2016; Baliga, Raut and Kamble, 2019), and employee welfare (Longo, Mura and Bonoli, 2005; Ahi and Searcy, 2015b). However, based on the results of the confirmatory factor analysis, the employee welfare is excluded from the construct of social sustainability practices.

6.2.3 Performance outcomes of SSCM practices

The identification of performance outcomes of implementing SSCM practices was an important endeavor to develop a comprehensive conceptual framework of this study. From

the examination of related literatures in SSCM, performance outcomes sustainability practices are measured with environmental, social and economic performance indicators. Hence, the performance outcomes of sustainable practices cover environmental, social, economic measures. The environmental performance indicators include reduction in solid and water waste (Hanim et al., 2012; Mitra and Datta, 2014), reduction of environmental accidents (Ahi and Searcy, 2015a; Baliga, Raut and Kamble, 2019), decrease in consumption of hazardous toxic materials (Hanim et al., 2012; Ahi and Searcy, 2015a). The social sustainability performance measures cover improvement of company images (Hoejmose and Adrien-Kirby, 2012; Baliga, Raut and Kamble, 2019), enhancement of corporate images as an ethical organization(Shafiq et al., 2014; Mani et al., 2016), and improved employee or community health and safety (Ahi and Searcy, 2015b; Baliga, Raut and Kamble, 2019). The economic performance outcomes contain increase in sales of products (Mitra and Datta, 2014; Baliga, Raut and Kamble, 2019), reduction in costs of processing and distribution (Rao and Holt, 2005; Hoejmose and Adrien-Kirby, 2012), and increase in organizational profit and profit margins (Rao and Holt, 2005; Mitra and Datta, 2014).

6.3 Critical factors of SSCM and SSCM practices

The adoption of SSCM practices can either be enabled or inhibited by various contingent factors (Mastos and Gotzamani, 2022). These identified factors are named as critical factors, which include enablers, drivers, as well as barriers of SSCM practices. SSCM practice is defined as a set of sustainability practices undertaken in an organization in cooperation with each stakeholder, to promote effective sustainability management of its supply chain (Mastos and Gotzamani, 2022). According to Ansari and Kant (2017) all the three factors play a crucial role in the success or failure of the implementation of SSCM. As per the findings, the study which implies that depending only the pressure exerted by the drivers do not guarantee the effective adoption of SSCM initiatives rather it requires to capitalize on the enablers to successfully implement SSCM practices. The empirical findings confirmed the statistical significance and positive theoretical relationships between the drivers and enablers to the adoption of SSCM practices. Hence, it is asserted that a combination of both the driving forces and the enabling capabilities are acknowledged as crucial critical factors to effectively and efficiently adopt environmental and social sustainability initiatives. Besides, the implementation of SSCM practices is not free from challenges, thus, firms need to identify the

potential barriers that hinder the adoption of SSCM initiatives. The empirical findings of the study confirmed that barriers have a negative relationship with the adoption environmental and social sustainability practices.

6.3.1 Drivers of SSCM and SSCM practices

The results obtained from the empirical analysis of the study revealed that the set of drivers that form the drivers construct have a helpful influence on the organizations in the Ethiopian coffee supply chain in adopting SSCM initiatives. The drivers (DRI) construct has a direct impact on both the environmental and social sustainability practices and an indirect impact on the performance outcomes of the sustainability practices of the implementing organizations. Therefore, this study has confirmed that drivers are set of major driving forces that lead coffee producing organizations to adopt SSCM initiatives. The statistical results demonstrate that DRI construct has a positive and significant relationship with the constructs environmental sustainability practices (ESP) having standardized coefficient of $\beta = 0.431$ (sig at the 0.000 level) and social sustainability practices (SSP) with standardized coefficient and $\beta = 0.228$ (sig. at the 0.014 level). This finding is in line with the results of similar studies (Chkanikova and Mont, 2015; Sajjad, Eweje and Tappin, 2020; Nath, Eweje and Barua, 2024) and can be supported with the justification that the implementation of SSCM practices is challenging task for organizations, hence, it needs the support and collaboration of stakeholders such as governmental organizations, customers, and suppliers. Guimarães et al. (2022) elucidated social responsibility, economic performance and improvement, regulations (environmental, regional, international), and the adoption of an innovative business model as the sources of the driving forces that trigger the adoption of SSCM initiatives in the Brazilian coffee supply chain. Besides, Nguyen et al. (2023) stated that drivers such as top management sensitivity and commitment, regulatory pressure, market pressure, and competitive pressure are the main drivers of sustainable supply chains from the perspectives of the Vietnamese coffee industry. Consequently, the successful adoption of environmental and social sustainability practices demands the involvement of stakeholders to initiate and implement SSCM practices and achieve the performance outcomes of sustainability.

6.3.2 Enablers of SSCM and SSCM practices

The empirical findings confirmed that the bundle of factors that create the enablers construct have a positive impact on the firms in the Ethiopian coffee industry in facilitating the implementation of SSCM practices. The enablers (ENA) construct has a direct influence on

environmental sustainability practices as well as the social sustainability practices whereas it has an indirect impact on the performance outcomes of the sustainability practices. Thus, the investigation has proven that enablers are set of major factors that enable coffee producers and suppliers to implement SSCM practices successfully. The statistical results reveal that the enablers construct has a positive and significant relationship with the constructs environmental sustainability practices (ESP) having standardized coefficient of β = 0.262 (sig at the 0.007 level) and social sustainability practices (SSP) with standardized coefficient and β =0.591 (sig. at the 0.000 level). This result is consistent with the conclusion of related studies (Mangla et al., 2018; Vargas, Mantilla and de Sousa Jabbour, 2018; Mastos and Gotzamani, 2022) and can be augmented with the argument forwarded by Mubarik and Khan (2024), it is important to capitalize on the enablers to effectively steer the implementation of sustainability initiatives.

According to Hidayati, Garnevska and Childerhouse (2023), enablers to implement SSCM initiatives in the agrifood supply chain can be categorized into seven groups. The first is related to the attitudes or behaviors of individual actors and can motivate the implementation of sustainable practices. The second group comprises information and communication enablers, and the regular exchange of information and communication encourages actors within the supply chain to improve sustainable practices and capture more value. The third group of enablers is institutionally related; the institution can help actors in a supply chain to collectively take actions, such as proceeding with contractual arrangements. The fourth class of enablers is related to the role of the government, and the regulation and intervention of the government provide the essential ability to successfully practice sustainability. The fifth category includes facilitation in various forms, including training and incentives, which help actors accelerate the implementation of sustainable practices. The sixth class comprises market-related enablers, and access to sustainable markets encourages the implementation of sustainability practices in agrifood supply chains and provides a better opportunity. The final group of enablers is related to certifications for determining the standard practices and compliance. Furthermore, Mangla et al. (2018) identified and analyzed enablers to successfully implement sustainability in agrifood supply chains in an Indian context. They have identified enablers such as incentives and support of various agencies, understanding customer and stakeholder requirements, understanding the importance and benefits of sustainability initiatives, management involvement, support and commitment,

resource allocation and information sharing within and across the hierarchy, joint planning and capacity building for delivering sustainable products, monitoring and auditing ongoing supply chain activities, and cost-effectiveness and improvements in overall performance.

6.3.3 Barriers of SSCM and SSCM practices

Organizations face lots of barriers when attempting to implement sustainable supply chain initiatives (Gupta, Kusi-Sarpong and Rezaei, 2020). Similarly, the empirical findings of the study revealed that the barriers construct has negative effect on Ethiopian coffee producing firms trying to implement SSCM practices. Thus, the barriers (BAR) construct has a direct negative impact both dimensions of SSCM, the environmental sustainability practices and social sustainability practices, and an indirect negative impact on the organizational performance outcomes construct. Accordingly, the research has proven that barriers are a battery of factors that restrain coffee producers and suppliers to implement SSCM practices successfully. The statistical results reveal that the barriers construct has a negative and significant relationship with the constructs environmental sustainability practices (ESP) having standardized coefficient of β= - 0.231 (sig. at the 0.010 level) and social sustainability practices (SSP) β= - 0.244 (sig. at the 0.008 level). The findings of this study are consistent with prior studies (Menon and Ravi, 2021a; Sahu et al., 2023; Nath, Eweje and Barua, 2024), which argue that barriers to SSCM adoption pose a challenge on organizations in the implementation of sustainability initiatives. For example, Guimarães et al. (2022) have identified lack of government support, the high complexity of the processes and communication gaps as the main barriers in adopting SSCM practices in the Brazilian coffee industry. Besides, Adams, Donovan and Topple (2023), pointed out that barriers to sustainability initiatives such as resistant to cultural change, high implementation costs, and the absence of suitable technological solutions, lack of sustainability policy and legal framework, and lack of resources to effectively monitor their distant suppliers. Elhidaoui and Kota (2023) pointed out that the barriers to sustainable practices are high costs, lack of knowledge, insufficient support from stakeholders, and lack of regulation. High cost of acquiring advanced technology, building reverse logistics, and implementing sustainability standards. Lack of knowledge of sustainability practices and benefits is another barrier. Moreover, stakeholders' failure to play their role, such as a lack of cooperation from suppliers and poor customer awareness, are challenges in implementing sustainability initiatives. The lack of regulations in sustainable supply chain perspectives and failure to comply with existing

regulations are other setbacks. Hence, Gupta, Kusi-Sarpong and Rezaei (2020) advised to equip supply chain actors with a better understanding of the characteristics of these barriers and overcoming strategies because it is expected to offer them better pathways for dealing with the barriers and prompting change towards supply chain sustainability innovation goals.

6.4 SSCM practices and performance outcomes

As per the scope of this study, SSCM practices include two important dimensions, specifically environmentally and socially sustainability practices. Social sustainability practices make sure the conformance to human rights inside the organization and the contribution of the firm to society at large. Whereas, the environmental sustainability practices comprise the adaptation of all the processes, techniques, and approaches that improve the environmental quality either by reducing emissions or waste (Mubarik and Khan, 2024). The implementation of SSCM practices allow firms to achieve sustainability performance outcomes. Sustainability performance outcomes refers to how well an organization realizes its environmental, social, and economic goals (Seuring and Müller, 2008). Moreover, Baliga, Raut and Kamble (2019) have confirmed that the performance measures of the SSCM practices encompass the economic, environmental and social parameters of the supply chain. Plethora of studies reveal that environmental sustainability practices impact the environmental, operational, and financial performance of organizations (Rao and Holt, 2005; Mitra and Datta, 2014; Paulraj, Chen and Blome, 2017). Organizations with excellent social sustainability practices acquire social legitimacy, leading to an enhanced business environment and better financial earnings (Wang and Sarkis, 2017). In addition, Wolf (2014) has confirmed that firms that implement environmental and social practices in their supply chains are perceived as good corporate citizens, hence have access to critical resources and could be more successful than their competitors.

6.4.1 Environmental sustainability practices and performance outcomes

It is believed that environmental sustainability practices result in a reduction in usage of raw materials, and reduction in waste emissions thereby to an improvement in environmental and economic performance. Furthermore, Jum'a et al. (2022), have revealed that sustainability innovations impact significantly the environmental, social sustainability performance of organizations. Similarly, the empirical finding of the study confirmed that environmental sustainability practices (ESP) have a positive and significant impact on the environmental,

social, and economic performance outcomes having standardized coefficient of β =0.373 (sig at the 0.000 level). This result is consistent with the findings of Opoku et al. (2023), in their study carried out in the Ghanian food production industry, they confirmed that sustainable practices have positive associations with environmental, social, and economic performance. In addition, Baliga, Raut and Kamble (2019), in their investigation concerning SSCM practices and performance outcomes from the perspectives of developing countries, have found out that environmental sustainability practices lead to environmental, social, and economic performance. Besides, Mugoni, Kanyepe and Tukuta (2024) stated that environmental sustainability practices such as green purchasing, green manufacturing, green distribution, green product design, green information systems, and reverse logistics have a direct influence on environmental performance.

6.4.2 Social sustainability practices and performance outcomes

Theoretically, it is believed that organizations which implement environmental and social sustainability practices in their supply chains, are considered as good corporate citizens and have access to critical resources and are expected to be financially successful (Wolf, 2014). Furthermore, social sustainability practices enable firms to establish good relationships with multiple stakeholders such as employees, customers, business partners and the community and to enhance the firm's social reputation as well as financial performance (Wu et al., 2015). Ajibike et al. (2023) in their study have obtained empirical proof to establish strong and positive impact of social responsibility practices on firms' environmental sustainability performance. Mani, Jabbour and Mani (2020), verified that social sustainability practices have a direct and positive impact on supply chain performance, supplier performance, operational performance, and customer performance. Likewise, this study's empirical result showed that social sustainability practices (SSP) have positive and significant impact on the environmental, social, and economic performance outcomes having standardized coefficient of β =0.249 (sig at the 0.005 level). This result is consistent with the empirical findings of Baliga, Raut and Kamble (2019), who asserted social sustainability practices have significant positive on environmental, social, economic performance of firms. Moreover, Saeidi et al. (2015) suggested that corporate social responsibility indirectly contributes to a performance of a firm by improving the reputation and competitive advantage, thereby enhancing the satisfaction of customers.

6.5 The conceptual framework of the study

The drivers, enablers, and barriers of SSCM, environmental and social sustainability practices, the performance outcomes of the SSCM practices and the derived relationships between the six constructs were used to craft the conceptual framework of the study. Therefore, the main objective of the study has been achieved by developing and proposing a conceptual model to integrate SSCM practices to the Ethiopian coffee supply chain. To measure the six constructs of the conceptual model, a set of indicators have been derived based on the existing literature in the SSCM field and a complete measurement model was developed. Moreover, a conceptual model was proposed with a set of derived hypotheses, which was tested and evaluated by applying an empirical study to prove its validity and statistical significance. The conceptual framework is developed based on extensive theoretical understandings and it is validated with empirical data obtained from the Ethiopian coffee industry. Moreover, the framework is developed considering the unique social, political, economic and topographic characteristics of the country. Therefore, it is a vital instrument to integrate SSCM initiatives into the Ethiopian coffee industry. The conceptual framework is expected to help policy makers and managers in the industry to initiate and successfully implement SSCM programs. Figure 6.1 presents the conceptual framework of the study.

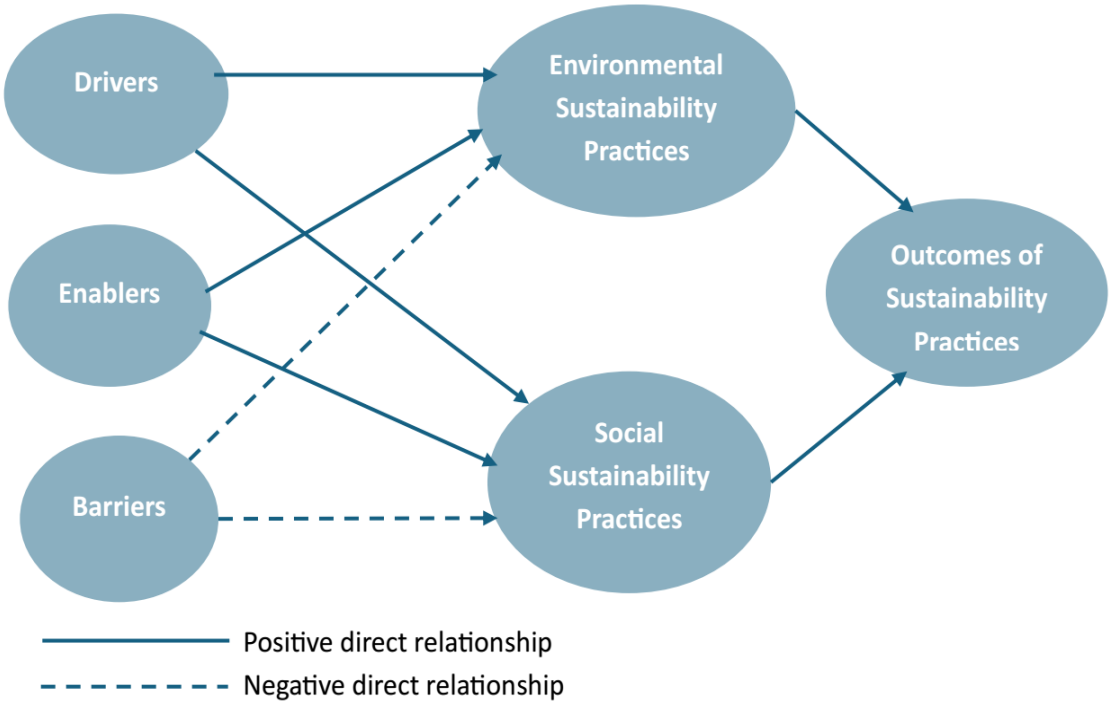


Figure 6.1: The conceptual framework of the study

6.5.1 Model evaluation and validation

In addition to the measurement model evaluation, the conceptual framework model was evaluated through the assessment of collinearity issues, significance and relevance, the model's explanatory power, and the model's predictive power.

First, the collinearity issues evaluation indicated that the path coefficients of the structural model are not biased because none of the predictor constructs of the model reach at critical levels of collinearity because all the VIF values are visibly below the threshold of 3. These values indicates that there are no collinearity issues among the predictor constructs of the structural model. The non-existence of multicollinearity issues among the predictor's constructs of the conceptual framework of the study confirmed that the path coefficients of the structural model are not biased (Sarstedt, Ringle and Hair, 2021).

Second, the path coefficients of the model were found statistically significant by applying the PLS-SEM algorithm through the bootstrapping resampling technique to verify it is a valid model without a doubt as suggested by Hair et al. (2022b). The assessment of the model through bootstrapping procedure has shown that all the path coefficients of the model are also statistically significant according to the empirical t values and their corresponding p values at a significant level of 5%. According to Hair et al. (2022b) the bootstrapping procedure is appropriate for testing a model's significance and relevance, and to uphold the model as a statistically significant and valid model. Hence, summary of the model's path estimates together with t values, and p values have been considered for the model estimation and found that all criteria lead to the same conclusion to prove the model's statistical significance and relevance. Therefore, all the derived hypotheses of the final conceptual model were proven with statistical support and found to be statistically significant.

Third, the assessment of the explanatory power has confirmed that the conceptual model has acceptable predictive power through the coefficient of determination, because the R square values for all the endogenous constructs are greater than the threshold of 0.10 as recommended by Falk and Miller (1992). The R square values refer to the combined impact of all the associated exogenous constructs on the endogenous construct (Rigdon, 2012; Sarstedt et al., 2014). For instance, the endogenous constructs environmental sustainability practices (ESP), social sustainability practices (SSP) and outcomes of sustainability practices (OSP) have R square value of 0.223, 0.426, and 0.150 respectively, which are the combined effect of all the connected exogenous constructs of the model. Thus, the model explained

22%, 43%, and 15% of the constructs' variance of the endogenous constructs as a result of change in all the connected exogenous constructs. As per Chin (1998), the change in R square values explore the impact of each independent construct on the dependent construct. Moreover, the examination of effect size, f square, confirmed the substantive impact of each independent construct on the dependent construct of the model because all the f square values are greater than the threshold of 0.02 (Cohen, 2013). This indicates that there is no exogenous constructs in the conceptual framework which have no effect on their corresponding endogenous constructs.

Finally, to assess the predictive power of model, as suggested by Shmueli et al. (2019) the researcher has focused on the study model's key endogenous construct, instead of examining the prediction errors in all of the endogenous constructs' indicators. Therefore, the researcher has focused on the key endogenous construct of the model that is outcomes of sustainability practices (OSP) and evaluated all the seven indicators. As a result, the researcher found that the PLS path model has lower predictive error (RMSE) as compared to the naive LM model benchmark for all seven indicators. Hence, it can be understood and concluded that the study's model has a high predictive power. Moreover, researchers can apply another means to evaluate the PLS path model's predictive accuracy by calculating the Q square value (Geisser, 1974; Stone, 1974). As a guideline, Q square values should be larger than zero for a specific endogenous construct to indicate predictive accuracy of the structural model for that construct. A positive Q square predict value indicates that the PLS path model's prediction error is smaller than the prediction error given by the naïve benchmark (Hair et al., 2019). Therefore, all the indicators of the endogenous constructs of the study's model have Q square predict values which are significantly greater than zero. Therefore, this indicates that the PLS path model of the study has an acceptable predictive accuracy.

In a nutshell, the conceptual model had been proposed together with a set of derived hypotheses based on the evidence from existing literature to integrate SSCM practices in the Ethiopian coffee supply chain. The synthesis of the existing literature revealed that the conceptual model is theoretically and conceptually important to incorporate SSCM initiatives successfully. Moreover, the evaluation of the model through an empirical survey proved that the proposed conceptual model is statistically significant and valid. Besides, the derived hypotheses of the final conceptual model were statistically supported. Therefore, this model can be applied in the context of the Ethiopian coffee supply chain to adopt SSCM practices.

6.5.2 Benefits of the conceptual framework

This study has developed and proposed a conceptual framework to integrate SSCM into the Ethiopian coffee industry. The findings of the study confirmed that environmental and social sustainability practices resulted in environmental, social, and economic performance outcomes while considering the impact of the interplay between drivers, enablers, and barriers. Moreover, a thorough evaluation of the conceptual model proved it to be a valid and statistically significant model. The conceptual model can be used as a holistic framework to determine the impact of drivers, enablers, and barriers that determine the adoption of SSCM into the Ethiopian coffee industry. Identification of relevant key critical factors that affect the integration of SSCM can assist business managers in implementing SSCM practices successfully. The conceptual model can be used to determine the corresponding performance outcomes of implementing SSCM practices in the Ethiopian coffee supply chain. That means it can help practitioners and policymakers understand the commensurate performance outcomes firms will enjoy as a result of the implementation of environmental and social sustainability initiatives. Besides, business managers in the Ethiopian coffee industry can use this model for better managing and evaluating the implementation of SSCM practices.

6.5 Chapter summary

This chapter presented a thorough discussion of the research findings obtained from the empirical investigation of the hypothesized theoretical associations that intend to address the proposed research questions. The chapter began by proposing the final research model informed by the results of the hypothesis testing and then proceeded to provide an overview of theoretical views of SSCM prompted by this empirical analysis. Subsequently, the research findings regarding the critical factors that determine the adoption of SSCM practices were discussed. Then, the empirical findings about the theoretical connections between SSCM practice implementation and the corresponding performance outcomes were presented. These theoretical perspectives derived from the empirical data were examined separately, exposing measurements and conclusions that have led to important advancements in the field of SSCM. In this regard, the research findings were also examined in light of the state of the literature at the time, showing agreement with the findings of more recent studies and enabling the reporting of final conclusions. This thesis is concluded in the following chapter, which also discusses the study's contributions, managerial implications, research limits, and potential future paths.

CHAPTER SEVEN: CONCLUSION

7.1 Overview

This chapter brings the research project to an end by presenting the synopsis of the study, then reviewing the objectives and questions of the research, outlining the major contributions of the study, and highlighting the most important implications derived from the research findings. Furthermore, limitations of the study are discussed, and suggestions for future research directions are forwarded. The conclusion chapter presents the synopsis of the project and revisits the research objectives and how they were achieved. It then describes the answers to the research questions, reviewing them and discussing the methods employed to address each research questions. Next, the chapter discusses the comprehensive perspectives of SSCM, outlining the suggestions and future directions. The main managerial implications that emanate from this empirical study are also presented. The main theoretical and empirical contributions delivered by this study are described, which also stipulates a wide range of significances of the study. Research directions and opportunities of study are discussed, which elucidates the future directions and highlights the research limitations and recommendations. Finally, the chapter concludes with a summary.

7.2 Synopsis of the research

SSCM (SSCM) is considered as the initial phase of a new era that integrates social performance, economic contribution, and environmental performance that is also called the intersection of the three domains of sustainable development (Ansari and Kant, 2017). In general, during the past 20 years, SSCM has emerged as a thriving field of study that is gaining a growing interest from scholars and industry professionals (Mubarik and Khan, 2024). Currently, the awareness regarding sustainability is increasing, and it is important to ensure that supply chain operations are socially and environmentally sustainable. Allaoui et al. (2018) asserted that agrifood supply chains are under increasing pressure from consumer organizations, environmental advocacy groups, and policymakers to address the sustainability of their supply chains. As a result, markets in developed countries such as Europe are requiring producers of agricultural products such as coffee to ensure that their supply chains are free from deforestation and forest degradation (EU, 2023). Hence, it is becoming evident that businesses must modify their traditional approaches to attain sustainability (Roy, Silvestre and Singh, 2020). Developing sustainable supply chains requires

profound understanding of the transition from traditional to sustainable supply chains (Pagell and Shevchenko, 2014; Kitsis, 2018). A number of studies have been conducted on coffee-producing countries such as Brazil (Branco and dos Santos, 2019; Guimarães et al., 2022), Vietnam (Newton, Agrawal and Wollenberg, 2013; Nguyen and Sarker, 2018), Indonesia (Jaya and Raharja, 2014) and México (Contreras-Medina et al., 2020). Nevertheless, research on SSCM (SSCM) in coffee producing countries in Africa such as Ethiopia remains limited. The sustainability challenges are not similar for all countries, and coffee farmers have different situations; hence, there is no one size solution that fits to all (Bozzola et al., 2021). Therefore, it is fundamental to understand the sustainability perspectives of each coffee-producing country and propose tailored solutions based on ecological, social, and economic contexts. In addition, owing to the slow pace of adoption of SSCM in emerging economies, the field of study is in its infancy stage (Khan et al., 2021). In addition, most empirical research on SSCM is carried out in developed countries from the buyer's perspective. Hence, to understand the varying aspects of SSCM, more empirical research is required in developing countries (Jia et al., 2018). Consequently, researchers such as Ben Brik, Mellahi and Rettab (2013), Esfahbodi, Zhang and Watson (2016) and Jia et al. (2018), have called for more research concerning SSCM in developing countries to increase generalizability and inclusivity at global scale. The quest to embrace sustainability in the coffee supply chain is persistent; however, there is no understanding of how SSCM can be integrated and which aspects should be prioritized (Guimarães et al., 2022). Although prior researches have addressed the research gaps related to the critical factors of sustainability in other supply chains, it is crucial to conduct an in-depth industry study that considers the existing context (Saeed and Kersten, 2019; Dai, Xie and Chu, 2021; Guimarães et al., 2022). Hence, studying the issues of SSCM in the coffee industry not only makes a substantial contribution to addressing the sustainability issues of the sector but also to the ongoing theoretical discourse in the field (Nab and Maslin, 2020). Hence, it is vital and important to try to comprehend these complexities and uncertainties from both an academic and practical standpoint. This research project has theorised and empirically evaluated a comprehensive model relating theoretical linkages among the fundamental themes of the study, the critical factors to adopt SSCM initiatives, implementation of SSCM practices, and the corresponding performance outcomes to enhance understanding of this topic in general.

The set of driving and enabling factors are identified as necessary triggers and facilitators to

the successful implementation of SSCM practices, which include environmental and social sustainability practices. Therefore, the effective implementation of SSCM practices is determined by the symbiotic existence of both the drivers and the enablers of SSCM adoption, which resulted in improved environmental, social, and economic performance outcomes. Simultaneously, it is important to understand the adoption of SSCM practices is compromised due to barriers that inhibit the implantation sustainability initiatives. Figure 7.1 presents the general overview of the findings of the study.

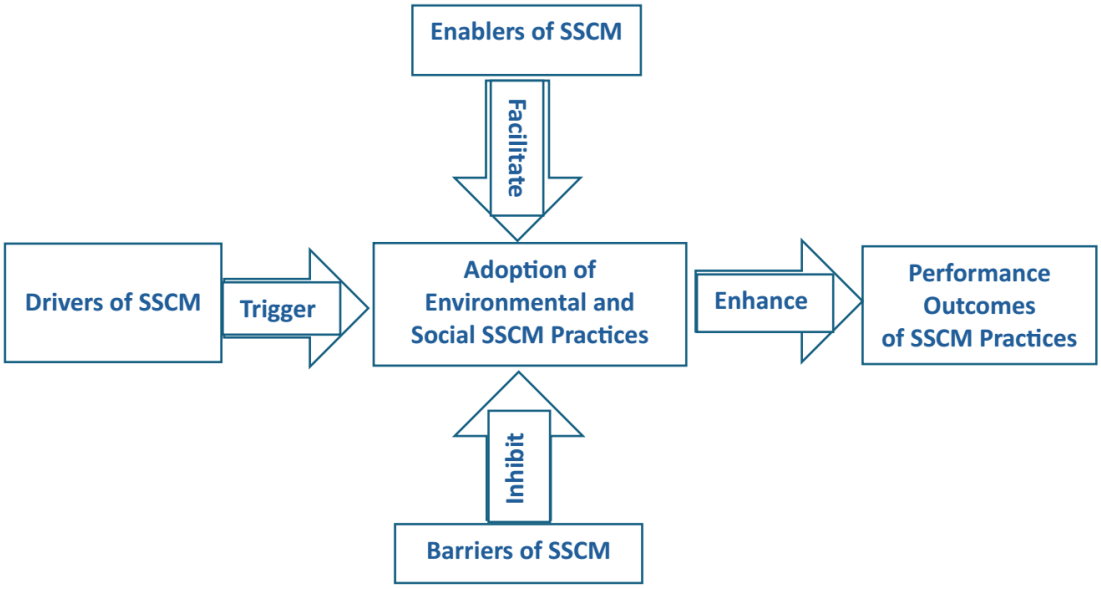


Figure 7.1: General overview of the findings of the study

7.3 Research objectives revisited

This research study had four objectives:

RO1: To identify the critical factors that determine the adoption of SSCM initiatives in the Ethiopian coffee supply chain.

RO2: To elucidate the environmental and social sustainability practices in the Ethiopian coffee industry.

RO3: To explore the performance outcomes of the implementation of SSCM practices.

RO4: To develop a comprehensive conceptual framework to integrate SSCM practices.

RO5: To validate the proposed conceptual framework with empirical survey.

To accomplish these objectives, this study performed a thorough review of relevant literature in the field of SSCM. To do this, relevant literature on the critical factors to adopt SSCM initiatives, specifically the drivers that trigger the adoption of SSCM practices, the enablers that facilitate the implementation, and the barriers that impede the integration of

sustainability initiatives is explored (RO1). Moreover, as per the conceptual scope of the study, the two main dimensions of SSCM practices, the environmental and social sustainability practices, are explored from the relevant literature from the perspectives of supply chains in the developing countries (RO2). Besides, the environmental, social, and economic performance outcomes of implementing SSCM practices are also investigated from the appropriate literature (RO3). An overlapping literature review strategy was applied to synthesise these three primary study themes. As a result, the theoretical relationships between the critical factors, which include the drivers, enablers, and barriers; SSCM practices which cover environmental and social sustainability practices; and the SSCM performance results were examined and addressed.

Furthermore, well-established measurement scales from earlier and recent studies have been adopted to create the proper scales for measuring the three main themes of the study. Several statistical analyses were conducted to make sure that the measures used were reflecting scales of the self-reporting scales and confirm the construct validity. The successful accomplishment of the first three research objectives has made it possible for this study to craft a comprehensive conceptual framework that covers critical factors, SSCM practices, and performance outcomes of implementing SSCM practices, which is the final objective of the study (RO4). Then, a quantitative technique through a survey questionnaire was employed to empirically evaluate and validate the conceptual framework of the study. Accordingly, this study gathered 202 sets of data from knowledgeable and experienced managers who work in the Ethiopian coffee industry. These managers included general managers, logistics managers, operation managers, plant managers, and supply chain managers. The research findings derived from the empirical results indicate that the hypothesised causal relationships depicted in the conceptual framework of the study were verified using the partial least square structural equation modelling (PLS-SEM) technique. Therefore, the proposed conceptual framework to integrate SSCM into the Ethiopian coffee industry is validated through the empirical data obtained from respondents in the study area (RO5). Considering the sampling technique employed, which permits statistical inference for the entire population, the research moderately states that the responses to the research questions prompted within this empirical investigation are fairly generalisable and consistent for the Ethiopian coffee industry.

7.4 Answers to the research questions

The study formulated three main research questions:

RQ1: What are the critical factors that determine the adoption of SSCM practices?

RQ2: What impact does the implementation of SSCM practices have on the performance of the firm?

RQ3: How SSCM practices can be integrated in the Ethiopian coffee supply chain?

By successfully realizing the research objectives, the study attempted to address the research questions. The findings of the study obtained by examining and evaluating the proposed conceptual framework permitted the study to successfully address the research questions. The comprehensive nature of the conceptual framework of the study helped the researcher to integrate the three core themes of this research into a single and comprehensive model which enables it to address the research questions.

Moreover, considering the acceptable indicators and the statistical significance support for the hypotheses of the study, it is believed that the proposed model is a good representation of the theoretical relationships between the research constructs of the study and can answer the research questions. The empirical findings indicate that the critical factors determine the successful implementation of SSCM practices, which primarily consist of a set of drivers, enablers, and barriers. These findings of the research advise that both the drivers and enablers should be capitalized, and the barriers should be neutralized to successfully implement SSCM initiatives; these essentially address RQ1 of the study. Hence, the coffee growers and exporters in Ethiopia may struggle to implement SSCM practices without capitalizing on the drivers and enablers and overcoming the barriers to adopting SSCM initiatives. A symbiotic combination of these drivers and enablers is considered necessary for adopting an SSCM agenda. At the same time, the identification of the potential barriers and formulating a strategy to minimize their negative impact is essential for the adoption of SSCM practices. According to the findings of the study, the adoption of SSCM practices can result in environmental, social, and economic performance among the Ethiopian coffee producing firms. Therefore, these empirical findings revealed that the adoption of SSCM leads to improve environmental and social performance, thereby increasing the economic returns of firms, addressing Q2.

Thus, it is generally argued that the adoption of SSCM practices results in better environmental and social performance as well as improving economic gains. The successful adoption of SSCM practices is environmentally, socially, and economically essential and improves environmental protection, enables firms to address their social obligation, and enhances economic earnings. This research study adds to the current knowledge about SSCM by clarifying the performance outcomes of undertaking SSCM initiatives. Moreover, the crafted conceptual framework shows how SSCM practices can be integrated into the Ethiopian coffee supply chain by capitalizing on the drivers and enablers while minimizing the negative impact of barriers; this answers Q3. Figure 7.2 illustrates the general overview of the adoption of SSCM practices.

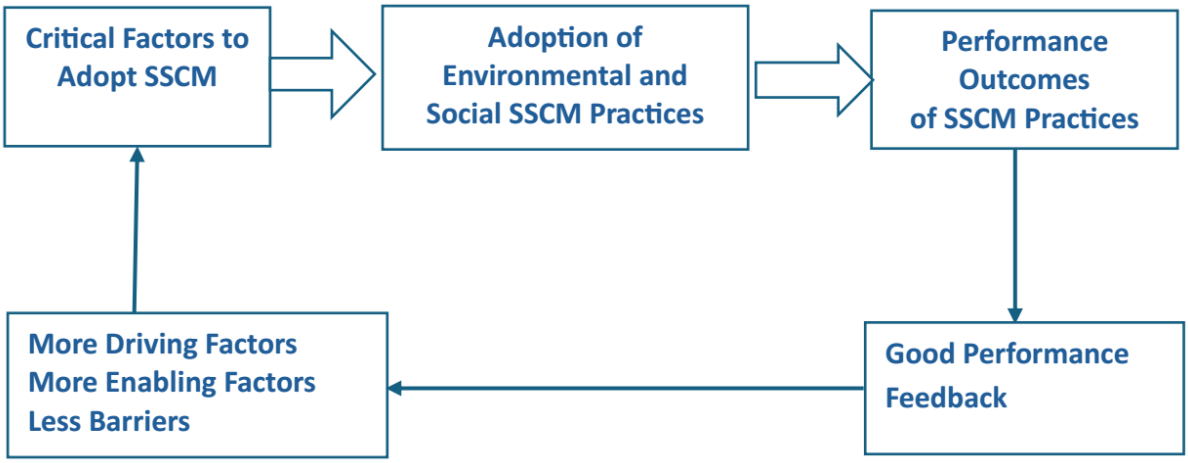


Figure 7.2: General overview of the adoption of SSCM practices

The findings of the study confirmed that drivers and enablers assist organizations to adopt SSCM practices, which resulted in environmental, social, and economic performance outcomes. The enhanced paybacks on environmental, social, and economic performance in turn encourage these organizations to persist in implementing the SSCM practices. First, the superior performance outcome obtained can satisfy the interests of main stakeholders, including shareholders, suppliers, customers, and society at large; thus, my result in increased driving pressure to continue undertaking SSCM practices. Second, the high-performance outcomes can also motivate the internal stakeholders, such as the top management and employees, as well as create an enabling environment to continue implementing the SSCM agenda. Third, the enhanced motivation of the internal and external stakeholders may result in more commitment and the allocation of more resources, thereby reducing the barriers that hamper the adoption of SSCM initiatives.

Moreover, the integration of SSCM into the Ethiopian coffee industry using the conceptual framework of the study facilities the realization of the United Nations SDGs (UN, 2015). The accomplishment of the environmental and social sustainability dimensions would help the Ethiopian government to implement majority of the 17 SDGs. Table 7.1 shows the linkage between the adoption of SSCM and the realization of the United Nations SDGs.

Table 7.1: Linage between the dimensions of SSCM and SDGs

UN SDG	Description	SSCM Dimension
Goal 1. No Poverty	End poverty in all its forms everywhere	Social sustainability
Goal 2. Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Social sustainability
Goal 3. Good Health and Well-being	Ensure healthy lives and promote wellbeing for all at all ages	Social sustainability
Goal 4. Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Social sustainability
Goal 5. Gender Equality	Achieve gender equality and empower all women and girls	Social sustainability
Goal 6. Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all	Social sustainability
Goal 7. Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all	Social sustainability
Goal 8. Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Social sustainability
Goal 12. Responsible Consumption and Production	Ensure sustainable consumption and production patterns	Environmental sustainability
Goal 13. Climate Action	Take urgent action to combat climate change and its impacts	Environmental sustainability
Goal 14. Life Below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Environmental sustainability
Goal 15. Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Environmental sustainability
Goal 17. Partnerships for the Goals.	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development	Social and Environmental sustainability

Source: author's own work

7.5 Managerial implications

Practitioners and policymakers can be advised of some implications based on the research findings of this study. This study confirmed that implementing SSCM practices can enhance the environmental, social, and economic performance of firms; thus, practitioners are provided with more insights on how to improve organizational performance through the adoption of the SSCM initiatives. Moreover, managers can also comprehend the relationship between the drivers, enablers, and barriers to adopting SSCM practices to achieve greater improvements in environmental and social performance and eventually economic returns.

This study offers business practitioners a validated conceptual framework for evaluating how SSCM practices can improve the environmental, social, and economic performance of firms. The conceptual framework of the study outlines the main SSCM practices in the supply chain that must be undertaken in the context of the Ethiopian coffee industry, including environmental and social sustainability practices. These two main findings regarding the implementation of SSCM practices may provide managers with helpful guidelines. Consequently, agrifood supply chains such as coffee producers are provided with helpful information on the actions, they must undertake to successfully adopt the SSCM initiatives.

This research may help regulatory bodies and policymakers by providing additional insights on how to encourage the Ethiopian coffee industry to implement SSCM practices. Government agencies and regulatory bodies can encourage businesses implementing SSCM practices by providing incentive packages offered in the form of grants, subsidies, or tax breaks. Poor awareness about SSCM and difficulty of changing the mindset of employees and organizational culture are some of the barriers that obstruct the adoption of SSCM practices by organizations. Thus, policymakers can advocate the adoption of SSCM practices by sharing experiences to create awareness regarding the benefits and performance improvements attained from successful implementation of sustainability initiatives.

Generally, the study provides practitioners and regulatory policymakers with reliable and relevant knowledge regarding how SSCM is implemented considering the critical factors and the resulting performance outcomes in the context of the Ethiopian coffee industry.

7.6 Theoretical and empirical contributions

The purpose of this study was to theoretically develop and empirically validate a conceptual framework that establishes relationships between the drivers, enablers, and barriers to adopting environmental and social sustainability practices and the corresponding performance outcomes. In accomplishing this key aim, this study has provided several noteworthy theoretical and empirical contributions.

7.6.1 Theoretical contributions

This study mainly contributes to the SSCM field by developing a comprehensive conceptual framework that can assess the impacts of SSCM implementation on firms in the Ethiopian coffee supply chain. Moreover, the performance implications of adopting SSCM with the presence of the effects of the drivers, enablers, and barriers, considering the existing fragmented and disjointed relevant literature. The proposed conceptual framework of the study is novel in the field of SSCM by combining the three primary SSCM research themes into a particular comprehensive model, which allows to undertake comprehensive and integrated research. Bringing together the three research themes of the study with six constructs of the critical factors to adopt SSCM initiatives, the implementation of SSCM practices and the resulting performance paybacks have not been addressed in the current SSCM literature from the perspectives of producers in developing countries like Ethiopia (Esfahbodi, Zhang and Watson, 2016; Jia et al., 2018). In this sense, the study is expected to extend the boundaries of the SSCM body knowledge by offering a novel conceptual framework for evaluating the impact of adopting SSCM practices on the firms in the Ethiopian coffee industry. This may offer a more comprehensive perspective on the critical factors, SSCM practices, and performance outcomes themes that may guide future research directions to enhance the maturity of the SSCM field of study.

Furthermore, this study is expected to contribute to the understanding of how the interplay between the drivers, enablers, and barriers to adopting SSCM practices impacts the implementation of environmental and social sustainability initiatives. The study also contributes to the body of knowledge regarding SSCM by enhancing the understanding that drivers of SSCM can take to a limited extent in promoting SSCM adoption, but the enablers of SSCM are also necessary for the successful implementation. Besides, since the adoption of SSCM is challenging, the research contended that firms face barriers in their endeavour to

adopt SSCM practices. This underlines that prior to the adoption of SSCM practices, firms should identify the drivers and enablers that facilitate the adoption as well as the barriers that inhibit the implementation.

7.6.2 Empirical contributions

The SSCM field of study regarding the supply chains in developing countries, such as producers and suppliers in the Ethiopian coffee industry, is still relatively unexplored. As a result, a plethora of researchers are calling for more SSCM empirical studies to be undertaken from the perspectives of supply chains in developing countries (Esfahbodi, Zhang and Watson, 2016; Guimarães et al., 2022; Habib et al., 2024). Moreover, as per Jia et al. (2018), the empirical research from the viewpoint of suppliers in developing countries is essentially still infant and mostly focuses on the buyers in the developing countries. Consequently, this study is useful since it offers an empirical finding regarding the effects of implementing SSCM initiatives on the performance outcomes for the producers and exporters in the Ethiopian coffee supply chain. The study has empirically investigated the impact of drivers, enablers, and barriers to adopting SSCM initiatives on the implementation of environmental and social sustainability practices in the context of developing countries.

7.7 Limitations of the study

Even though the study has considered the key critical factors to adopt SSCM initiatives, the main environmental and social SSCM practices, and the dimensions of performance outcomes from developing countries' perspectives, other items and constructs may exist that are not included in the research model. Hence, the study does not contend that all critical factors, SSCM practices, and performance indicators have been exhaustively included in the research model, nor can the model completely provide a verification on all the critical factors, the SSCM practices, and the corresponding performance paybacks. Additional research items and constructs could be added to the model, but more time and budget are required, which was not viable within the scope of this research.

The geographical study area of the research was the coffee industry in Ethiopia, and the empirical survey to collect relevant data was undertaken in a single country. Therefore, the empirical findings of the study may not be generalizable to other sectors and other geographical circumstances. In addition, the conceptual framework has been crafted mainly considering the large and medium coffee producers and exporters in the Ethiopian coffee

industry, excluding smallholder farmers and other stakeholders in the industry. Thus, the research model could be modified to incorporate the perspectives of all coffee producers, regardless of their size, and all stakeholders in the Ethiopian coffee supply chain.

Finally, while the research offers valuable managerial and practical insights and recommendations, it lacks an implementation roadmap. The study could be complemented by and benefit from a more detailed implementation roadmap for firms seeking to integrate SSCM practices effectively.

7.8 Future research directions

This study has limitations, but it offers an opportunity for further research in the future. Regarding the critical factors to adopt SSCM initiatives, the environmental and social sustainability practices, and the performance outcomes, further studies could be undertaken by including more factors, practices, and indicators based on the context of the industry and the geographical area of the study. In addition, the economic dimension of the sustainability, particularly in relation to cost-benefit analysis for firms requires further investigation. This may increase the complexity of the research, but it would complement and enhance the generalizability of the findings of this study.

Considering the focus of this study on the coffee industry and the applied research model, the other future research direction is to experiment with the applicability of the proposed conceptual framework. Future research could examine the application of the theoretical framework in different industries and organizations as well as compare the new findings with the results of this research. Furthermore, more studies can be undertaken at different geographic areas to investigate any variations in a context that could result in different findings. Hence, the future research avenue that could strengthen the research's generalizability in this aspect would be to replicate the study for comparative analysis in other developing countries. A comparative analysis with other developing nations would also enhance the external validity of the findings.

Besides, it is recommended to undertake comparative studies to explore the competitive advantage of the Ethiopian coffee industry in comparison to the top-ranking coffee producing countries in the world by benchmarking the best practices. The research offers valuable managerial and practical insights and recommendations; however, it needs a more detailed roadmap to successfully implement the SSCM practices. Therefore, the development of a

detailed implementation roadmap for firms seeking to integrate SSCM practices effectively could be an area of future research. Furthermore, the role of digital technologies such as blockchain, big data, remote sensing, and artificial intelligence in enhancing SSCM in the Ethiopian coffee supply chain is not explored, therefore, it can be potential area of future research.

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Appendix A

A.1 Publication of Article

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RESEARCH ARTICLE

Business Strategy and Development WILEY

Critical factors to adopt sustainable agrifood supply chain management in developing countries: The case of Ethiopian coffee industry

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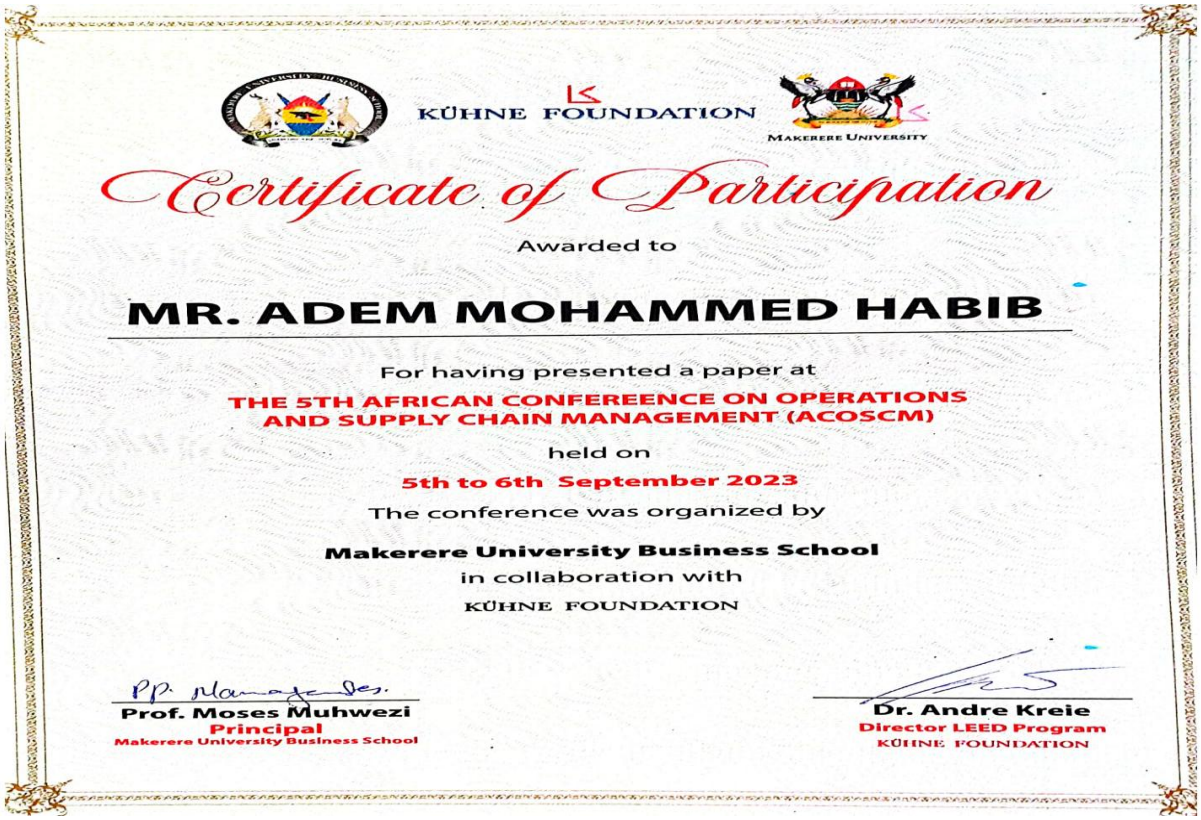
Abstract

Global agrifood supply chains are under increasing pressure to address sustainability issues due to growing concerns. However, numerous organizations within the agrifood industry are struggling to incorporate sustainable supply chain management practices and address the concerns. Therefore, this research is designed to identify the key critical factors, such as drivers, enablers, and barriers to adopting sustainable practices. This study considers the Ethiopian coffee industry, which is an important sector not only for the Ethiopian economy but also for the global agrifood supply chain. To accomplish the objectives of this study, we applied a systematic literature review and empirical survey. A systematic literature review was conducted to identify critical factors for adopting sustainability in agrifood supply chains. An empirical survey was then undertaken in the Ethiopian coffee industry to rank the key critical factors. Hence, the study has revealed that economic and productivity improvement, cost effectiveness and improvement in the overall performance, and difficulty in mindset and cultural changes as the key critical factors that determine the adoption of sustainability initiatives from the perspectives of the Ethiopian coffee supply chain. The findings can be used as input by government regulatory bodies and policymakers to craft strategies and policies to adopt sustainability initiatives and ensure sustainable development. Furthermore, the research is expected to contribute to the existing literature by bringing in the perspective of suppliers in developing countries.

KEYWORDS

agrifood supply chain, critical factors, developing countries, Ethiopian coffee industry, sustainability, sustainable development

A.2 Presentation of conference papers



Appendix B

B.1 The questionnaire

Questionnaire Survey

I. Screening and Demographic Questions

1. Which of the following best categorizes your position?
   a. General Manager
   b. Plant Manager
   c. Logistics Manager
   d. Operation Manager
   e. Supply Chain Manager
   f. If other, please specify:
   _____
2. Years in current position: _____
3. Your Age: _____
4. Your Educational Qualification/level:
   a. Diploma
   b. First Degree
   c. Second Degree
   d. If other, please specify:
   _____
5. Your company's core business: (You can select more than one)
   a. Producer
   b. Wholesaler
   c. Exporter

d. Other, specify _____

6. Your company's experience in the current business in years _____
7. Your company's size in terms of:
   a. Employee size: full time_____, Part-time _____
   b. Initial capital _____Current capital _____
   c. Volume of exports three years average (in quintals) _____
8. Your organization's sales revenue for the last budget year: _____ (in Birr)
9. Nature of your firm's ownership:
   a. Sole proprietorship
   b. Partnership
   c. PLC
   d. Share Company
   e. Cooperatives
   f. Other, specify _____
10. Your email address or telephone number, if you wish to receive a copy of the research summary report (optional):
    _____

II. Determinants of SSCM (SSCM) Practices

In your organization's effort to implement SSCM initiatives, rate the following factors according to their relevance to your organization.

(Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent). Please put a tick (√) mark in one of the five possible rating boxes.

1	**Drivers to Adopt SSCM Initiatives**	1	2	3	4	5
1.1	Government policies or legislation are factors that strongly encourage us to adopt sustainable practices.					
1.2	Regulations (environmental, regional, international) are factors that strongly encourage us to adopt sustainable practices.					
1.3	Supply chain collaboration is a factor that strongly encourages us to adopt sustainable practices.					
1.4	Access to technology is a factor that strongly encourages us to adopt sustainable practices.					
1.5	The conclusion of sustainable processes is a factor that strongly encourages us to adopt sustainable practices.					
1.6	Economic improvement is a factor that strongly encourages us to adopt sustainable practices.					
1.7	Supportive organizational culture is a factor that strongly encourages us to adopt sustainable practices					
1.8	Adopting an innovative business model is a factor that strongly encourages us to adopt sustainable practices.					
1.9	Competitive advantage is a factor that strongly encourages us to adopt sustainable practices.					
1.10	Reputation is a factor that strongly encourages us to adopt sustainable practices.					
1.11	Social responsibility is a factor that strongly encourages us to adopt sustainable practices.					
2	**Enablers to Adopt SSCM Initiatives**	**1**	**2**	**3**	**4**	**5**
2.1	Incentive and support of various agencies to undertake sustainable initiatives is a factor that strongly enables us to adopt sustainable practices					

2.2	Joint efforts, planning and capacity building for delivering sustainability focused products are a factor that strongly enable us to adopt sustainable practices					
2.3	Understanding customer and other stakeholder requirements is a factor that strongly enables us to adopt sustainable practices.					
2.4	Understanding the sustainability initiative, importance and benefits is a factor that strongly enables us to adopt sustainable practices					
2.5	Management involvement, support and commitment is a factor that strongly enables to adopt sustainable practices					
2.6	Resources allocation and sharing information within and across the hierarchy with an organization is a factor that strongly enables us to adopt sustainable practices.					
2.7	Monitoring and auditing the ongoing supply chain activities is a factor that strongly enables us to adopt sustainable practices.					
2.8	Cost effectiveness and improvements in overall performance are a factor that strongly enables us to adopt sustainable practices.					
3	**Barriers to Adopt SSCM initiatives**	**1**	**2**	**3**	**4**	**5**
3.1	Complex legal or regulatory requirements is a factor that strongly hinders from adopting sustainable practices.					
3.2	Lack of government support is a factor that strongly hinders from adopting sustainable practices					
3.3	Lack of proper technology or tools is a factor that strongly hinders us from adopting sustainable practices.					
3.4	Communication gaps and inadequate collaboration between parties are a factor that strongly hinders us from adopting sustainable practices.					
3.5	Unclear sustainability principles and measures are a factor that strongly hinders us from adopting sustainable practices.					
3.6	Sustainability risks or uncertainty are a factor that strongly hinders from adopting sustainable practices.					
3.7	High complexity of the processes is a factor that strongly hinders us to adopt sustainable practices.					
3.8	Difficulty in mindset/cultural changes is a factor that strongly hinders us from adopting sustainable practices.					
3.9	Lack of top and middle management support is a factor that strongly hinders us from adopting sustainable practices.					
3.10	Lack of skilled professionals or workers is a factor that strongly hinders us from adopting sustainable practices.					
3.11	High financial costs or lack of resources are a factor that strongly hinders us from adopting sustainable practices.					
3.12	Poor awareness is a factor in my company that strongly hinders it from adopting sustainable practices.					

III. Environmental Sustainability Practices

Please indicate the extent to which you perceive that your company is implementing each of the following environmental sustainability practices.

(Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent). Please put a tick (√) mark in one of the five possible rating boxes.

1	**Sustainable Process Design**	**1**	**2**	**3**	**4**	**5**
1.1	Evaluation of our existing processes to reduce their impact on the environment.					
1.2	Design the processes to avoid the production of emissions and exposure of hazardous substances.					
1.3	Design of the processes to reduce resource consumption on the production.					
2	**Waste Minimization**	**1**	**2**	**3**	**4**	**5**
2.1	Optimization of processes for the reduction of solid waste, air emissions and noise.					
2.2	Design processes so that the quantity of waste or scrap is minimized.					
2.3	Usage of cleaner production technologies in our processes.					
3	**Packaging Improvements**	**1**	**2**	**3**	**4**	**5**
3.1	Evaluation of packaging materials to ensure that they are beneficial, safe and health for individuals and communities.					
3.2	Packaging materials meet market criteria for performance and cost.					
3.3	Packaging materials are physically designed to optimize materials and energy.					
3.4	Plan for preventing packaging waste and reducing consumption of raw materials in packaging.					
3.5	Development of technical specifications for packaging with regard to the formats and quality standards.					
4	**Environmentally Responsible Purchasing**	**1**	**2**	**3**	**4**	**5**
4.1	Guiding our suppliers to establish environmental improvement programs and cleaner production technologies.					
4.2	Motivating and encouraging suppliers for Environmental Management System certifications.					
4.3	Purchase of products or inputs with eco-labels.					
5	**Green and Reverse Logistics**	**1**	**2**	**3**	**4**	**5**
5.1	Put demands on our transport service providers to be environmentally certified.					
5.2	Usage of environmentally friendly modes of transportation.					
5.3	Included environmental criteria in the assessment of transport providers.					
5.4	Optimization of efficiency through the use of energy efficient vehicles.					
5.5	Reverse logistics processes in place for the organization's waste products.					
5.6	Proper disposal of waste generated in the reverse logistics process.					
6	**Customer Sustainability Information**	**1**	**2**	**3**	**4**	**5**
6.1	Providing information to customers on environmentally friendly products.					
6.2	Cooperation with customers for cleaner production.					
6.3	Conduct planning and taking joint decisions with customers about ways to reduce the environmental impact of our activities.					

6.4	Developing a mutual understanding of responsibilities regarding environmental performance.					
7	**Environmental Certification**	**1**	**2**	**3**	**4**	**5**
7.1	Implementation of Environmental management systems like ISO 14000 to reduce our environmental impact.					
7.2	Select new suppliers based on criteria which include ISO 14000.					
7.3	Incentivize and motivate existing suppliers for conformance to ISO standards.					

IV. Social Sustainability Practices

Please indicate the extent to which you perceive that your company is implementing each of the following social sustainability practices (Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent). Please put a tick (√) mark in one of the five possible rating boxes.

1	**Human Right**	**1**	**2**	**3**	**4**	**5**
1.1	Does not engage in child labor or sweatshop labor at our processing and distribution locations.					
1.2	Audits suppliers for non-employment of children and bonded labor.					
1,3	Has an employee policy which incorporates human rights.					
1.4	Protects claims and right of aboriginal people or local community.					
2	**Safety and Health**	**1**	**2**	**3**	**4**	**5**
2.1	Adopted an Environmental Health and Safety (EHS) policy and organization.					
2.2	Ensure availability of minimum health care facilities at organizations locations.					
2.3	Provides our employees with training on health and safety issues.					
3	**Equality and Ethics**	**1**	**2**	**3**	**4**	**5**
3.1	Payment of scheduled taxes and customary dues in time.					
3.2	Not using substandard materials in the production process.					
3.3	Ensure workplace diversity and equal opportunities for all employees.					
3.4	Ensure policies for gender non-discrimination.					
3.5	Ensure payment of wages equal to or higher than average industry wages.					
3.6	Incentives and promotion are based on merit.					
4	**Philanthropy and Social Welfare**	**1**	**2**	**3**	**4**	**5**
4.1	Construct health camps in and around processing facilities.					
4.2	Donate to social and religious organizations.					
4.3	Help in the construction of water construction facilities in rural areas.					
4.4	Encourage employees to volunteer for local charitable works.					
4.5	Construction of schools or training institutions in rural areas.					
4.6	Buying products from underprivileged section of the society.					
5	**Socially Responsible Purchasing**	**1**	**2**	**3**	**4**	**5**
5.1	The organization has a supplier code of conduct.					
5.2	The organization has ethical sourcing training programs for the purchasing department.					

5.3	Has specific audit procedures to ensure that our suppliers adhere to our social expectations.					
5.4	Monitor our suppliers to ensure adherence to our social expectations.					
5.5	Ensure that our suppliers do not use child labor or bonded labor (means of repayment for a loan).					
5.6	Ensure that our suppliers provide a healthy and safe working environment for their employees.					
5.7	Ensure that our suppliers provide their employees with protectives equipment in hazardous areas.					
6	**Employee Welfare**	**1**	**2**	**3**	**4**	**5**
6.1	Attempting to provide the salaries that fairly reward employees for their work.					
6.2	Educating and training employees for skill development.					
6.3	Providing employees with a pension or retirement saving plan.					
6.4	Scholarships for meritorious wards of employees					

V. Outcomes of SSCM Practices

By adopting sustainability in your supply chain, please indicate the extent to which you perceive that your organization has achieved each of the following during the past three years.
(Five-point scale: 1= Not at all; 2=To a small extent; 3= To a moderate extent; 4=To a relatively great extent; 5= To a great extent). Please put a tick (√) mark in one of the five possible rating boxes.

1	**Environmental Performance**	**1**	**2**	**3**	**4**	**5**
1.1	Reduction in solid and water waste					
1.2	Reduction of environmental accidents					
1.3	A decrease in consumption of hazardous toxic materials					
2	**Social Performance**	**1**	**2**	**3**	**4**	**5**
2.1	Improvement in the images '' a good place to work in''					
2.2	Enhancement of corporate images as an ethical organization					
2.3	Improved employee or community health and safety					
3	**Economic Performance**	**1**	**2**	**3**	**4**	**5**
3.1	Increase in sales of coffee					
3.2	Reduction in costs of processing and distribution					
3.3	Increase in organizational profit and profit margins					