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Postgraduate Dissertation

Sustainability in Supply Chains: Performance Measurement, Implementation Conditions, and Current Challenges

Despoina Giosma

Supervisor: Tom Dasaklis

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Abstract

Sustainability has become a strategic priority for organizations seeking to improve competitiveness, resilience, and long-term value creation within increasingly complex global supply chains. As a result, Sustainable Supply Chain Management (SSCM) has gained growing attention from both researchers and practitioners. However, many organizations continue to face challenges in translating sustainability intentions into measurable performance outcomes.

The purpose of this study is to examine the factors influencing sustainability performance in supply chains, with particular emphasis on sustainability measurement practices, implementation drivers, and implementation barriers.

A quantitative research design was adopted using a structured online questionnaire distributed to professionals working in supply chain, logistics, procurement, and related business functions. A total of 100 valid responses were collected and analysed using SPSS. The analysis included descriptive statistics, reliability testing, correlation analysis, and multiple regression analysis.

The findings indicate that sustainability measurement practices and implementation drivers have a positive and statistically significant effect on sustainability performance. Implementation drivers were identified as the strongest predictor of performance. In contrast, implementation barriers did not demonstrate a statistically significant effect. The regression model explained 56.7% of the variance in sustainability performance, indicating strong explanatory power.

The study concludes that successful sustainability outcomes depend more on the presence of enabling organizational conditions, such as leadership commitment, strategic alignment, and effective measurement systems, than on the absence of barriers. The research contributes to the SSCM literature by providing an integrated empirical framework linking measurement practices, drivers, barriers, and sustainability performance.

Keywords: Sustainable Supply Chain Management, Sustainability Performance, Performance Measurement, Drivers, Barriers, Supply Chain Management.

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Περίληψη

Η βιωσιμότητα έχει εξελιχθεί σε στρατηγική προτεραιότητα για τις επιχειρήσεις που επιδιώκουν να ενισχύσουν την ανταγωνιστικότητα, την ανθεκτικότητα και τη μακροπρόθεσμη δημιουργία αξίας μέσα σε ολοένα και πιο σύνθετες παγκόσμιες εφοδιαστικές αλυσίδες. Ως αποτέλεσμα, η Βιώσιμη Διαχείριση Εφοδιαστικής Αλυσίδας (Sustainable Supply Chain Management - SSCM) έχει προσελκύσει αυξανόμενο ενδιαφέρον τόσο από την ακαδημαϊκή κοινότητα όσο και από τους επαγγελματίες του χώρου. Παρ' όλα αυτά, πολλές επιχειρήσεις εξακολουθούν να αντιμετωπίζουν δυσκολίες στη μετατροπή των προθέσεων βιωσιμότητας σε μετρήσιμα αποτελέσματα απόδοσης.

Σκοπός της παρούσας μελέτης είναι η διερεύνηση των παραγόντων που επηρεάζουν τη βιώσιμη απόδοση στις εφοδιαστικές αλυσίδες, με ιδιαίτερη έμφαση στις πρακτικές μέτρησης βιωσιμότητας, στους παράγοντες διευκόλυνσης της εφαρμογής και στα εμπόδια εφαρμογής.

Για την επίτευξη του σκοπού της έρευνας υιοθετήθηκε ποσοτική μεθοδολογική προσέγγιση μέσω δομημένου ηλεκτρονικού ερωτηματολογίου, το οποίο διανεμήθηκε σε επαγγελματίες που δραστηριοποιούνται στους τομείς της εφοδιαστικής αλυσίδας, των logistics, των προμηθειών και συναφών λειτουργιών. Συνολικά συλλέχθηκαν 100 έγκυρες απαντήσεις, οι οποίες αναλύθηκαν με τη χρήση του λογισμικού SPSS. Η ανάλυση περιλάμβανε περιγραφική στατιστική, έλεγχο αξιοπιστίας, ανάλυση συσχετίσεων και πολλαπλή γραμμική παλινδρόμηση.

Τα αποτελέσματα έδειξαν ότι οι πρακτικές μέτρησης βιωσιμότητας και οι παράγοντες διευκόλυνσης εφαρμογής επηρεάζουν θετικά και στατιστικά σημαντικά τη βιώσιμη απόδοση. Οι παράγοντες διευκόλυνσης αναδείχθηκαν ως ο ισχυρότερος προβλεπτικός παράγοντας της απόδοσης. Αντίθετα, τα εμπόδια εφαρμογής δεν παρουσίασαν στατιστικά σημαντική επίδραση. Το μοντέλο παλινδρόμησης εξήγησε το 56,7% της διακύμανσης της βιώσιμης απόδοσης.

Η μελέτη καταλήγει στο συμπέρασμα ότι η επιτυχής επίτευξη στόχων βιωσιμότητας εξαρτάται περισσότερο από την ύπαρξη ευνοϊκών οργανωσιακών συνθηκών, όπως η δέσμευση της διοίκησης, η στρατηγική ευθυγράμμιση και τα αποτελεσματικά συστήματα μέτρησης, παρά από την απουσία εμποδίων. Η έρευνα συμβάλλει στη σχετική βιβλιογραφία παρέχοντας ένα

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ολοκληρωμένο εμπειρικό πλαίσιο που συνδέει τις πρακτικές μέτρησης, τους παράγοντες διευκόλυνσης, τα εμπόδια και τη βιώσιμη απόδοση.

Λέξεις-κλειδιά: Βιώσιμη Διαχείριση Εφοδιαστικής Αλυσίδας, Βιώσιμη Απόδοση, Μέτρηση Απόδοσης, Παράγοντες Διευκόλυνσης, Εμπόδια, Εφοδιαστική Αλυσίδα.

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General Introduction

In recent years, sustainability has become a strategic priority for organizations operating in increasingly complex and globalized supply chains. Businesses are no longer evaluated solely on traditional performance criteria such as cost efficiency, quality, and delivery speed, but also on their ability to manage environmental impacts, promote ethical practices, and create long-term social and economic value. As a result, Sustainable Supply Chain Management (SSCM) has emerged as an important field of study and managerial practice.

SSCM refers to the integration of environmental, social, and economic considerations into the management of supply chain activities, relationships, and decision-making processes. Organizations are increasingly expected to reduce carbon emissions, improve resource efficiency, ensure responsible sourcing, and enhance supply chain transparency. Recent studies further suggest that firms adopting sustainability-oriented supply chain practices often achieve stronger operational performance, improved resilience, and enhanced competitiveness.

Despite growing interest in sustainability, many organizations continue to face challenges in implementing SSCM effectively. Common barriers include high implementation costs, limited resources, lack of expertise, supplier resistance, and difficulties in measuring sustainability outcomes. At the same time, enabling factors such as top management commitment, strategic alignment, stakeholder pressure, and digital transformation can significantly support successful implementation.

An important issue highlighted in the literature is that sustainability cannot be improved unless it is effectively measured. Organizations increasingly rely on sustainability performance indicators, key performance metrics, and reporting systems to monitor progress and identify improvement opportunities. However, many firms still lack structured measurement systems or fail to integrate sustainability metrics into broader supply chain performance management frameworks.

Although prior studies have examined sustainability practices, performance outcomes, drivers, and barriers, limited research has investigated these factors simultaneously within one empirical model. In particular, there is a need to understand how sustainability measurement practices,

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implementation drivers, and implementation barriers collectively influence sustainability performance.

Therefore, the present study examines the factors affecting sustainability performance in supply chains by focusing on three key predictors: sustainability measurement practices, implementation drivers, and implementation barriers. Using quantitative data collected through a questionnaire survey and analysed with SPSS, the study aims to provide empirical evidence on the organizational conditions that support sustainability success.

The findings of this research contribute to both theory and practice by offering a more integrated understanding of sustainability implementation and by providing recommendations for managers seeking to improve supply chain sustainability performance.

Chapter 1: Introduction to the Study

1.1 Background of the Study

Global supply chains have undergone substantial transformation in recent decades due to globalization, technological advancement, changing consumer expectations, and increasing regulatory pressure. While supply chains have traditionally focused on efficiency, responsiveness, and cost reduction, organizations are now expected to incorporate sustainability into their operations and strategic decision-making.

This shift has led to the development of Sustainable Supply Chain Management (SSCM), which seeks to balance economic performance with environmental stewardship and social responsibility. SSCM extends sustainability principles across sourcing, production, logistics, supplier relationships, and end-of-life product management.

Organizations adopting SSCM practices may benefit through reduced waste, lower emissions, stronger stakeholder relationships, enhanced reputation, improved innovation capability, and long-term competitiveness. Empirical studies from different countries and industries have reported positive relationships between sustainability-oriented supply chain practices and firm performance.

However, achieving sustainability outcomes requires more than policy statements or symbolic commitments. Organizations need robust measurement systems, implementation capabilities, leadership support, and collaboration across supply chain partners.

1.2 Problem Statement

Although sustainability has become an important business priority, many organizations struggle to translate sustainability intentions into measurable performance outcomes.

Previous studies have highlighted several challenges, including lack of sustainability metrics, insufficient management support, limited resources, operational complexity, and weak supplier

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engagement. Furthermore, many firms adopt isolated sustainability practices without integrating them into a coherent performance management system.

At the same time, the literature often examines sustainability drivers, barriers, or performance separately. Fewer studies investigate how these factors interact simultaneously to influence sustainability performance. This creates a research gap and justifies the need for an integrated empirical investigation.

1.3 Research Aim and Objectives

The main aim of this study is to examine the factors influencing sustainability performance in supply chains, with particular emphasis on sustainability measurement practices, implementation drivers, and implementation barriers.

The specific objectives of the study are:

1. To examine the role of sustainability measurement practices in improving sustainability performance.
2. To investigate the impact of implementation drivers on sustainability performance.
3. To assess whether implementation barriers hinder sustainability performance.
4. To analyse the combined effect of these factors through quantitative statistical analysis.
5. To provide recommendations for improving sustainability outcomes in supply chains.

1.4 Research Questions

The study addresses the following research questions:

1. How do sustainability measurement practices, implementation drivers, and implementation barriers influence sustainability performance in supply chains?
2. Which organizational factors have the strongest influence on sustainability performance within supply chain management?

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1.5 Significance of the Study

This study is significant for both academic research and managerial practice.

From an academic perspective, it contributes to the SSCM literature by integrating measurement practices, drivers, barriers, and performance into a single empirical framework.

From a practical perspective, the study helps managers understand which factors most strongly influence sustainability outcomes. This can support better decision-making, resource allocation, and strategic planning.

The study is particularly relevant in a business environment where sustainability increasingly affects competitiveness, compliance, and stakeholder trust.

1.6 Scope of the Study

The study focuses on professionals involved in supply chain, logistics, procurement, operations, and related business functions. Data were collected through an online questionnaire distributed to respondents with relevant professional knowledge.

The empirical analysis examines perceptions regarding sustainability practices and performance rather than audited objective firm data.

The study uses quantitative methods and statistical analysis conducted through SPSS.

1.7 Structure of the Dissertation

Chapter 1: Introduction to the study, research problem, aims, objectives, and significance.

Chapter 2: Literature review covering SSCM, performance measurement, drivers, barriers, and empirical evidence.

Chapter 3: Research methodology, including research design, questionnaire development, sampling, and data analysis methods.

Chapter 4: Data analysis and findings, including descriptive statistics, reliability analysis, correlation, and regression results.

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Chapter 5: Discussion of findings and managerial implications.

Chapter 6: Conclusions, limitations and future research.

Chapter 2: Literature Review

2.1 Sustainable Supply Chain Management

Supply chain management has traditionally focused on efficiency, cost reduction, and service level improvement (Christopher, 2016). However, increasing environmental degradation, social concerns, and regulatory pressure have shifted attention toward sustainability considerations (Carter & Rogers, 2008). Sustainable Supply Chain Management (SSCM) extends conventional supply chain management by integrating environmental, social, and economic objectives into supply chain activities (Seuring & Müller, 2008). According to the Triple Bottom Line framework, sustainability requires balancing economic performance with environmental protection and social responsibility (Elkington, 1997).

SSCM encompasses a wide range of practices, including sustainable sourcing, green logistics, waste reduction, energy efficiency, ethical labour practices, and supplier collaboration (Ahi & Searcy, 2013). Empirical research by Ageron et al. (2012) also suggests that sustainable supply management practices are increasingly integrated into supplier evaluation, purchasing policies, and long-term strategic sourcing decisions. Researchers emphasize that sustainability must be embedded across all stages of the supply chain rather than treated as an isolated function (Beske & Seuring, 2014). This holistic approach highlights the interdependence of supply chain actors and the need for coordination beyond organizational boundaries.

Although SSCM has gained widespread recognition, its implementation varies significantly across industries and regions (Govindan et al., 2015). Differences in organizational resources, regulatory environments, and stakeholder pressures influence the extent to which firms adopt sustainable practices. As a result, empirical research is needed to understand how sustainability is operationalized in real supply chain contexts. In recent years, Sustainable Supply Chain Management has evolved from a compliance-oriented concept into a strategic business capability (Koberg & Longoni, 2019). Earlier approaches to supply chain management focused primarily on operational efficiency, inventory reduction, cost minimization, and customer responsiveness. However, increasing environmental regulation, social expectations, and reputational risks have forced firms to reconsider how value is created across supply networks.

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Modern SSCM emphasizes that sustainability should be integrated into sourcing decisions, supplier evaluation, production planning, transport management, packaging design, and reverse logistics activities (Hassini et al., 2012). This broader perspective reflects the understanding that environmental and social impacts frequently occur beyond the focal firm and are distributed across upstream and downstream partners.

Several scholars argue that SSCM can create competitive advantage when sustainability initiatives are aligned with strategic objectives (Porter & Kramer, 2006). Pagell and Wu (2009) further argue that sustainable supply chain management requires organizations to redesign traditional supply chain practices in ways that simultaneously improve environmental and social performance while maintaining operational competitiveness. For example, firms may achieve lower waste costs, improved resource productivity, stronger stakeholder trust, and enhanced brand reputation. In this sense, sustainability should not be viewed solely as a cost burden, but also as an opportunity for innovation and resilience.

Recent disruptions in global supply chains, including pandemics, geopolitical instability, and energy price volatility, have further increased interest in SSCM. Organizations now recognize that sustainable and resilient supply chains are often interconnected, as transparency, supplier collaboration, risk diversification, and digital monitoring systems can simultaneously support both objectives (Ivanov & Dolgui, 2020).

2.2 Sustainability Performance Measurement in Supply Chains

Sustainability performance measurement has become a critical component of Sustainable Supply Chain Management (SSCM), as organizations increasingly seek to evaluate the economic, environmental, and social outcomes of their supply chain activities (Hassini et al., 2012). Traditional performance measurement systems were primarily focused on cost, quality, delivery, and efficiency (Christopher, 2016). However, the growing importance of sustainability has expanded the scope of performance measurement to include broader dimensions related to environmental protection, social responsibility, and long-term value creation (Elkington, 1997).

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According to the literature, effective sustainability performance measurement enables organizations to monitor progress, identify inefficiencies, support decision-making, and improve transparency across supply chain operations (Ahi & Searcy, 2013). Performance measurement systems also help firms align operational activities with strategic sustainability objectives while responding to increasing stakeholder expectations, regulatory pressures, and market demands (Seuring & Müller, 2008).

The growth of digital technologies has significantly improved sustainability measurement capabilities. Enterprise resource planning systems, IoT sensors, blockchain traceability tools, and business intelligence dashboards allow organizations to collect real-time sustainability data across supply chain networks (Ivanov & Dolgui, 2020). As a result, firms are increasingly able to move from reactive reporting toward predictive and continuous sustainability management.

Nevertheless, measurement challenges remain significant. Data inconsistency, weak supplier transparency, and the absence of common reporting standards often reduce comparability between organizations (Saeed & Kersten, 2019). These limitations are especially relevant for SMEs, which may lack dedicated sustainability analytics resources.

A widely accepted framework for assessing sustainability performance is the Triple Bottom Line (TBL) approach, which evaluates organizational outcomes across three dimensions: economic, environmental, and social performance (Elkington, 1997). The economic dimension includes profitability, cost reduction, productivity, and market competitiveness. The environmental dimension focuses on issues such as emissions reduction, waste management, energy efficiency, and resource utilization. The social dimension includes employee welfare, labour practices, community impact, health and safety, and ethical sourcing.

Several researchers emphasize that selecting appropriate indicators is one of the greatest challenges in sustainability measurement (Hassini et al., 2012). Many organizations collect large volumes of data but lack structured systems for converting information into meaningful performance insights. Taticchi et al. (2013) emphasize that sustainability performance measurement systems should integrate operational, strategic, and supply chain indicators in order to support more comprehensive managerial decision-making. Saeed and Kersten (2019) identified

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70 unique sustainability performance indicators derived from international standards and guidelines, highlighting the lack of consistency across existing measurement frameworks. Their study concluded that environmental indicators remain the most commonly used, followed by social and economic indicators.

Similarly, Hassini, Surti, and Searcy (2012) argue that there is no universal set of sustainability metrics applicable to all industries, as measurement systems must be adapted to sector characteristics, organizational priorities, and supply chain complexity. They further note that many companies struggle to integrate sustainability indicators into existing supply chain performance systems.

In practice, sustainability performance measurement may include indicators such as carbon emissions, recycling rates, energy consumption, supplier compliance, workplace safety, customer satisfaction, innovation capability, and financial returns (Ahi & Searcy, 2013). These indicators allow managers to assess whether sustainability initiatives generate measurable operational and strategic benefits.

Despite growing progress, the literature also highlights several limitations. Many organizations still emphasize short-term financial measures over long-term sustainability outcomes (Porter & Kramer, 2006). In addition, difficulties in data collection, supplier transparency, and lack of standardized reporting frameworks can reduce measurement accuracy and comparability across firms (Govindan et al., 2015).

For the purpose of the present study, sustainability performance measurement is viewed as the extent to which organizations systematically monitor and evaluate sustainability-related activities and outcomes within their supply chains. This concept is particularly relevant, as firms that actively measure sustainability performance are more likely to improve decision-making, resource efficiency, and overall sustainable performance.

Performance measurement systems play a central role in translating sustainability objectives into managerial action. Without appropriate metrics, organizations may publicly commit to sustainability while lacking the ability to monitor progress or evaluate outcomes. For this

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reason, many researchers describe measurement systems as a necessary condition for effective SSCM implementation (Beske & Seuring, 2014).

2.3 Drivers and Barriers of Sustainable Supply Chain Management Implementation

The successful implementation of Sustainable Supply Chain Management (SSCM) depends on a range of internal and external factors that either facilitate or hinder organizational sustainability initiatives (Seuring & Müller, 2008). These factors are commonly categorized in the literature as drivers and barriers. Understanding such factors is essential, as sustainability adoption often requires strategic commitment, operational change, collaboration with supply chain partners, and investment in new capabilities (Govindan et al., 2015).

Beyond managerial commitment, several external institutional forces can motivate SSCM adoption. Governments increasingly introduce environmental regulations, emissions targets, due diligence requirements, and reporting obligations that encourage firms to improve supply chain sustainability practices (Koberg & Longoni, 2019). Compliance pressure is particularly strong in export-oriented sectors serving multinational customers.

Market forces also act as drivers. Consumers increasingly prefer responsibly produced products, while investors pay greater attention to ESG performance. As a result, sustainability has become linked with market access, financing opportunities, and long-term firm valuation (Porter & Kramer, 2006).

Internal cultural factors are equally important. Organizations with learning-oriented cultures, cross-functional collaboration, and innovation capability are often more successful in embedding sustainability into daily decision-making processes (Beske & Seuring, 2014). Therefore, drivers should be viewed not only as external pressures but also as internal capabilities.

Concept	Definition
SSCM	Integration of environmental, social, and economic objectives into supply chain management

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Sustainability Performance	Organizational sustainability outcomes across multiple dimensions
Implementation Drivers	Factors facilitating sustainability adoption
Implementation Barriers	Factors constraining sustainability implementation

Table 2.1 Definitions of Key Concepts

2.3.1 Drivers of SSCM Implementation

Drivers refer to the forces that motivate organizations to adopt sustainable practices within their supply chains (Carter & Rogers, 2008). Prior research identifies regulatory pressure, customer expectations, competitive advantage, cost efficiency, stakeholder demands, reputational concerns, and top management commitment as some of the most influential drivers (Govindan et al., 2015).

According to Sajjad et al., (2015) key managerial drivers include customer expectations, top management commitment, ethical values of managers, reputation management, and expected economic and operational benefits. Their findings indicate that both financial motivations and ethical considerations can simultaneously encourage firms to adopt sustainability initiatives.

Similarly, research in the Brazilian coffee industry found that major sustainability drivers included social responsibility, improved economic performance, environmental regulations, and innovative business models (Lerman et al., 2022). These findings suggest that organizations increasingly recognize sustainability not only as a compliance issue, but also as a source of long-term strategic value.

Technological progress has also emerged as an important driver. Industry 4.0 tools such as automation, data analytics, digital monitoring systems, and blockchain can improve transparency, traceability, efficiency, and sustainability performance across supply chains (Ivanov & Dolgui, 2020). Recent studies argue that digitalisation acts as a strong enabler of SSCM implementation by improving decision-making and supply chain visibility (Hassini et al., 2012). Lerman et al. (2022) further highlight that sustainability implementation is increasingly

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supported by organizational learning, innovation capability, and supply chain digitalization initiatives.

Overall, the literature indicates that organizations are more likely to adopt SSCM practices when sustainability aligns with strategic goals, stakeholder expectations, operational efficiency, and market competitiveness. Sharma and Henriques (2005) also argue that stakeholder influences play a significant role in shaping organizational sustainability practices and environmental strategic orientation.

2.3.2 Barriers of SSCM Implementation

Despite growing awareness of sustainability, many organizations continue to face significant barriers when attempting to implement SSCM practices (Sajjad et al., 2015). These barriers may be financial, organizational, technological, cultural, or structural in nature.

Sajjad et al. (2015) identified cost concerns, structural limitations, supplier resistance, customer-related issues, and weak regulatory enforcement as major obstacles to SSCM implementation. These barriers often create tensions between short-term business priorities and long-term sustainability goals.

Likewise, Menon and Ravi (2022) found that a lack of awareness regarding sustainability benefits, weak regulations, lack of top management commitment, and absence of performance metrics were among the most critical barriers in the electronics industry. Their study highlights the importance of governance structures and managerial leadership in overcoming implementation challenges.

In developing countries, barriers can be even more pronounced due to limited infrastructure, lack of technical expertise, weak institutional support, and resource constraints (Jia et al., 2018). Jia et al. (2018) note that firms operating in developing economies often face additional pressures related to institutional instability and lower supply chain maturity levels.

Recent studies also show that sustainability implementation in service sectors and SMEs is constrained by low visibility across supply chains, lack of standardized sustainability criteria, and limited organizational capabilities (Koberg & Longoni, 2019).

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Although sustainability benefits are widely recognized, implementation barriers remain substantial. Financial constraints are frequently cited, particularly where sustainability investments require new technology, training, supplier development, or process redesign (Govindan et al., 2015). Short-term budgeting pressures may discourage long-term sustainability initiatives.

Organizational barriers also include resistance to change, weak internal coordination, and lack of employee engagement (Beske & Seuring, 2014). Sustainability often requires collaboration across procurement, operations, logistics, finance, and senior management. Where departments operate in silos, implementation becomes difficult.

Supply chain complexity creates further challenges. Many firms depend on multi-tier supplier networks with limited visibility beyond first-tier suppliers. This reduces the ability to verify labour conditions, environmental compliance, or raw material traceability (Seuring & Müller, 2008). These issues are especially problematic in global sourcing environments.

2.3.3 Synthesis and Relevance to the Present Study

The literature demonstrates that SSCM implementation is shaped by the balance between enabling forces and constraining factors (Seuring & Müller, 2008). While drivers such as management commitment, regulation, stakeholder pressure, and efficiency gains can accelerate sustainability adoption, barriers such as cost, complexity, weak capabilities, and resistance to change may delay or weaken implementation efforts (Sajjad et al., 2015).

For the purpose of the present study, implementation drivers and barriers are examined as two separate constructs influencing sustainability performance. This distinction is important, as organizations may simultaneously experience strong sustainability motivations while still facing practical implementation challenges (Ivanov & Dolgui, 2020).

Drivers	Barriers
Top management commitment	High implementation cost
Strategic alignment	Resistance to change
Customer pressure	Lack of expertise

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Digital technologies	Limited supplier cooperation
Regulatory requirements	Weak technological support

Table 2.2 Comparison of SSCM Drivers and Barriers

2.4 Sustainability Performance in Supply Chains

Sustainability performance refers to the extent to which organizations achieve positive outcomes across environmental, social, and economic dimensions through their supply chain activities (Elkington, 1997). Within the context of Sustainable Supply Chain Management (SSCM), performance is no longer assessed solely through traditional financial indicators such as cost efficiency and profitability. Instead, organizations are increasingly expected to create value while minimizing environmental harm and promoting socially responsible practices (Carter & Rogers, 2008).

Several studies suggest that organizations implementing sustainability practices within their supply chains often experience operational and strategic benefits. Research conducted by Zailani et al. (2012) further demonstrated that sustainable supply chain practices can improve organizational operational performance and environmental efficiency, particularly within Asian manufacturing environments. These benefits may include improved supplier relationships, enhanced reputation, increased customer loyalty, stronger risk management, and better compliance with regulatory requirements. Sustainability initiatives can therefore generate both direct and indirect performance advantages.

Recent empirical evidence further supports the positive relationship between SSCM practices and organizational performance. Studies indicate that firms with stronger sustainability integration often achieve higher efficiency, improved resilience, and superior long-term competitiveness (Koberg & Longoni, 2019). In particular, transparent and collaborative supply chains tend to perform better in addressing environmental and social challenges.

However, sustainability performance is not automatically achieved through policy adoption alone. Many organizations publicly commit to sustainability goals but struggle to translate

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these commitments into measurable outcomes (Seuring & Müller, 2008). Common reasons include insufficient measurement systems, weak supplier engagement, resource limitations, and fragmented implementation across the supply chain.

The literature also highlights that sustainability performance may vary significantly across industries, firm sizes, and geographical contexts. Large multinational firms often possess greater resources and stronger governance systems, whereas SMEs may face greater challenges despite strong intentions (Govindan et al., 2015). Similarly, firms operating in developing economies may encounter institutional and infrastructural constraints that affect sustainability outcomes.

For the purpose of the present study, sustainability performance is defined as the perceived level of successful environmental, social, and operational outcomes resulting from sustainability-related supply chain practices. This construct is particularly relevant, as it represents the final outcome influenced by measurement practices, implementation drivers, and implementation barriers.

2.5 Empirical Evidence on Sustainable Supply Chain Management and Performance

A growing body of empirical literature has examined the relationship between Sustainable Supply Chain Management (SSCM) practices and organizational performance across different countries, industries, and methodological approaches (Seuring & Müller, 2008). Overall, prior studies provide substantial evidence that the adoption of sustainability-oriented supply chain practices is positively associated with improved environmental, social, operational, and financial outcomes (Carter & Rogers, 2008).

In developing economies, empirical findings suggest that SSCM adoption can significantly enhance firm competitiveness and performance. For example, a study of Jordanian manufacturing firms used questionnaire data and regression analysis to examine the relationship between sustainable supply chain practices and company performance. The results indicated that firms adopting stronger sustainability practices reported better economic performance, although overall sustainability adoption remained at an early stage (Govindan et al., 2015).

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Alkhawaldeh et al. (2022) similarly reported that sustainable supply chain management practices positively influence organizational performance in developing country contexts.

Similarly, research conducted in Thailand's food sector found that both internal and external SSCM practices positively influenced firms' financial, environmental, and social performance (Hassini et al., 2012). Using data collected from 126 companies, the study concluded that sustainability initiatives can generate multidimensional performance benefits while also improving food quality assurance.

Further evidence from the United Arab Emirates food industry demonstrated that commitment to SSCM and sustainable reverse logistics significantly improved operational performance. Based on survey data from 315 firms, the findings emphasized the importance of managerial commitment and reverse logistics capabilities in strengthening both sustainability and competitiveness.

Recent studies also highlight the role of supply chain integration and digital transformation in supporting sustainability outcomes. A study of 800 Chinese manufacturing firms found that supplier integration and customer integration had a significant positive effect on environmental cost performance. Moreover, digital transformation strengthened these relationships, indicating that technological capabilities can enhance the benefits of SSCM implementation (Ivanov & Dolgui, 2020). Li et al. (2024) additionally found that digital transformation strengthens the positive relationship between supply chain integration and environmental cost performance within manufacturing firms.

Recent empirical evidence further supports the positive relationship between sustainability initiatives and organizational performance. Mukhtar, Arli, and Hussain (2026) found that the cumulative integration of lean production, sustainable supply chain management, and sustainable process innovation significantly improves triple bottom line sustainability performance. Their findings suggest that organizations can achieve stronger environmental, social, and economic outcomes when sustainability practices are integrated with operational excellence and innovation capabilities. (Mukhtar et al., 2026)

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At the supplier level, quantitative evidence from the automotive industry showed that supplier sustainability performance varies according to organizational characteristics such as firm size, business category, and geographical location (Koberg & Longoni, 2019). The findings suggested that larger suppliers and manufacturing-oriented firms tend to perform better in sustainability assessments, while buyer requirements can act as a major driver of supplier sustainability improvements.

More recent research has also examined sustainability diffusion across supply chains. Evidence from the Chinese semiconductor sector showed that when focal firms increase sustainability disclosure and demonstrate stronger sustainability commitment, suppliers and customers tend to improve their own sustainability performance. This indicates that sustainability can spread across supply chain networks through stakeholder influence and inter-organizational relationships (Beske & Seuring, 2014).

Although the majority of empirical studies report positive performance effects, the literature also notes that outcomes may vary depending on industry characteristics, organizational maturity, regulatory context, technological readiness, and managerial capabilities (Porter & Kramer, 2006). Similarly, Zhu et al. (2013) found that both internal and external green supply chain management practices positively influence organizational environmental and operational performance outcomes. In some cases, firms may adopt sustainability practices symbolically without achieving measurable operational benefits.

Studies also indicate that sustainability performance is often mediated by organizational capabilities such as innovation, supply chain integration, and digital transformation. This suggests that sustainability practices alone may be insufficient unless supported by broader managerial systems and strategic alignment.

Overall, prior empirical evidence strongly supports the view that SSCM can enhance firm performance. However, many existing studies focus only on direct SSCM practices or single dimensions of performance. Limited research simultaneously examines the combined effects of sustainability measurement practices, implementation drivers, implementation barriers, and

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sustainability performance within a unified empirical model. This gap provides the foundation for the present study.

Consequently, the present study adopts a multidimensional approach by examining measurement practices, drivers, and barriers simultaneously rather than focusing on a single isolated determinant.

2.6 Research Gap and Conceptual Framework

Although the literature on Sustainable Supply Chain Management has expanded considerably, several research gaps remain (Seuring & Müller, 2008). First, many prior studies focus on sustainability practices and performance outcomes without explicitly examining how sustainability is measured in practice. While performance measurement is widely recognized as essential, relatively few empirical studies investigate sustainability measurement practices as a distinct construct influencing sustainability performance (Hassini et al., 2012).

Second, existing studies often examine drivers and barriers of SSCM implementation separately. Research has identified a wide range of enabling factors, such as top management commitment, stakeholder pressure, and technological support, as well as barriers including cost concerns, lack of awareness, and limited supplier cooperation (Sajjad et al., 2015). However, these factors are rarely integrated into a single quantitative framework together with sustainability measurement practices and sustainability performance.

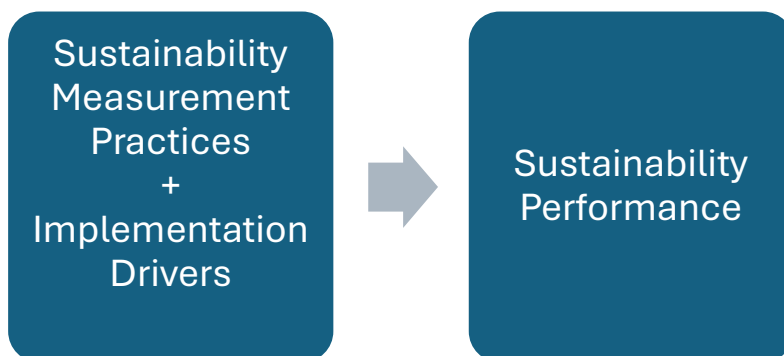
Third, a large proportion of empirical studies focus on specific sectors, countries, or dimensions of sustainability, such as environmental performance alone or supplier performance only (Govindan et al., 2015). While such studies provide valuable insights, they often do not offer a broader view of how multiple organizational factors interact to shape overall sustainability performance in supply chains.

In addition, previous empirical studies frequently emphasize direct relationships between SSCM practices and firm performance, but fewer studies examine whether performance is also influenced by the existence of formal sustainability measurement systems and the organizational conditions that support or hinder implementation (Ivanov & Dolgui, 2020). This creates a need for a more integrated empirical approach.

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The present study addresses these gaps by developing and testing a quantitative framework that simultaneously examines sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance. In doing so, the study contributes to the literature by offering a more comprehensive understanding of the factors that shape sustainability outcomes in supply chains.

Based on the literature reviewed, the conceptual model of the study assumes that sustainability performance is influenced by three main factors: sustainability measurement practices, implementation drivers, and implementation barriers. Sustainability measurement practices are expected to have a positive effect on sustainability performance, as organizations that systematically monitor sustainability are better able to improve it (Beske & Seuring, 2014). Implementation drivers are also expected to have a positive effect, as managerial commitment, strategy, and collaboration facilitate sustainability adoption (Carter & Rogers, 2008). In contrast, implementation barriers are expected to have a negative effect on sustainability performance, as financial, structural, and operational challenges may constrain implementation efforts.



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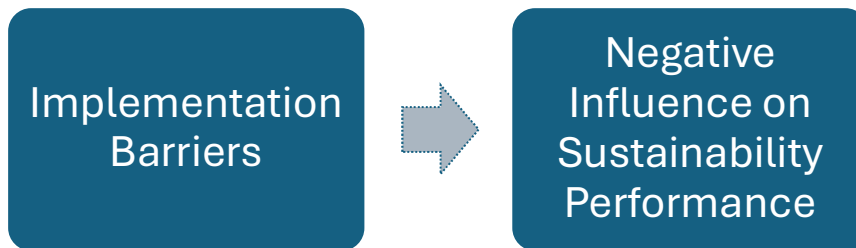


Figure 2.1 Conceptual Framework of the Study

2.7 Sustainability Research

Based on the literature reviewed and the conceptual framework developed in the previous section, this study proposes sustainability research concerning the relationship between sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance in supply chains (Seuring & Müller, 2008).

2.7.1 Sustainability Measurement Practices and Sustainability Performance

The literature suggests that organizations that systematically measure sustainability performance are better positioned to improve decision-making, monitor progress, identify inefficiencies, and align operational activities with long-term sustainability objectives (Hassini et al., 2012). Effective measurement systems enhance transparency, accountability, and continuous improvement across supply chain processes (Ahi & Searcy, 2013). Firms that track environmental, social, and operational indicators are therefore more likely to achieve stronger sustainability outcomes (Carter & Rogers, 2008).

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2.7.2 Implementation Drivers and Sustainability Performance

Previous studies identify several enabling factors that support the successful implementation of Sustainable Supply Chain Management practices. These include top management commitment, strategic alignment, stakeholder pressure, collaboration with supply chain partners, employee capabilities, and technological readiness (Sajjad et al., 2015). Organizations possessing such drivers are more capable of integrating sustainability into business operations and achieving positive performance outcomes (Beske & Seuring, 2014).

2.7.3 Implementation Barriers and Sustainability Performance

Despite increasing awareness of sustainability, organizations often face barriers that may hinder implementation efforts (Govindan et al., 2015). Common barriers include high implementation costs, limited resources, weak supplier cooperation, insufficient expertise, resistance to change, and lack of technological support. Such obstacles may reduce the effectiveness of sustainability initiatives and delay performance improvements.

Study	Main Focus	Key Findings
Carter & Rogers (2008)	SSCM framework	Sustainability integrates economic, environmental and social dimensions
Sajjad et al. (2015)	Drivers and barriers	Management support and cost pressures influence SSCM
Hassini et al. (2012)	Sustainability metrics	Measurement systems improve SSCM monitoring
Zhu et al. (2013)	Green SCM performance	SSCM positively affects performance

Table 2.3 Key findings of multiple studies.

Chapter 3: Research Methodology

3.1 Research Design

This dissertation adopts a quantitative research design in order to empirically investigate sustainability performance measurement and implementation in supply chains. A quantitative approach is considered appropriate because the objectives of the study involve measuring perceptions, identifying patterns, and examining relationships between predefined variables. Quantitative methods allow for statistical analysis and objective comparison across respondents, thereby enhancing the reliability and generalizability of the findings (Saunders et al., 2019).

The study employs a cross-sectional survey design, collecting data at a single point in time from professionals involved in supply chain, logistics, procurement, and sustainability-related roles. The survey-based approach enables the collection of standardized data from multiple organizations and supports the statistical examination of sustainability performance indicators, implementation enablers, and barriers.

Research philosophy refers to the set of beliefs concerning how knowledge is developed and how research should be conducted. In business and management studies, common philosophical approaches include positivism, interpretivism, realism, and pragmatism. The present study adopted a positivist orientation, as it sought to test relationships between clearly defined variables using quantitative data and statistical analysis (Bryman & Bell, 2011).

A positivist approach is appropriate where research aims to identify patterns, measure constructs objectively, and examine causal relationships. In the context of this dissertation, sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance were treated as measurable constructs captured through structured survey questions. Numerical responses were then analysed using statistical methods to identify relationships among variables.

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3.2 Data Collection Method

Primary data were collected using a structured questionnaire, developed based on an extensive review of the relevant literature on sustainable supply chain management. The questionnaire was designed to capture respondents' perceptions regarding sustainability performance measurement practices, factors enabling sustainability implementation, barriers to implementation, and overall sustainability performance.

The questionnaire was administered electronically using Google Forms, which allowed efficient distribution and facilitated data collection. Online surveys offer advantages such as ease of access, anonymity of respondents, and automatic data recording, which reduces the risk of data entry errors. Participation in the survey was voluntary, and respondents were informed that their answers would remain anonymous and be used exclusively for academic purposes.

The study employed a quantitative cross-sectional research design. Quantitative designs are widely used in supply chain management research where the objective is to perform tests and generalize findings across a sample population (Saunders et al., 2019). A cross-sectional design involves collecting data at a single point in time rather than over multiple periods.

This design was considered appropriate because it allowed the researcher to gather perceptions from respondents efficiently and compare patterns across organizations. Given time and resource limitations associated with postgraduate research, a cross-sectional survey provided a practical and academically accepted approach.

3.3 Questionnaire Design

The questionnaire consists of five main sections.

The first section collects demographic and organizational information, including industry sector, company size, respondents' role, and years of professional experience. These variables provide contextual information and support descriptive analysis of the sample.

The second section focuses on sustainability performance indicators used in supply chain management. Respondents were asked to evaluate the extent to which their organizations measure

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environmental, social, and economic sustainability indicators, such as carbon emissions, energy consumption, waste management, supplier social responsibility, and cost efficiency.

The third section examines enablers of sustainability implementation, including top management commitment, strategic alignment, employee capabilities, availability of data, technological support, supplier collaboration, regulatory pressure, and customer demand.

The fourth section addresses barriers to sustainability implementation, such as high costs, data collection difficulties, supply chain complexity, limited supplier cooperation, lack of technological systems, insufficient training, conflicts with short-term financial goals, and limited management attention.

The final section evaluates overall sustainability performance in environmental, social, and economic dimensions, as well as perceived improvement in sustainability performance over time.

All construct-related questions were measured using a five-point Likert scale, ranging from “Strongly disagree” to “Strongly agree.” This scale was selected because it is widely used in supply chain and sustainability research and is suitable for statistical analysis. This allowed respondents to express degrees of agreement while generating data suitable for quantitative analysis.

Primary data were collected through a structured questionnaire. The questionnaire was designed based on constructs frequently used in prior sustainable supply chain management literature and was organized into clear sections to improve response quality. Items were adapted to reflect sustainability measurement practices, implementation enablers, implementation barriers, and sustainability performance outcomes.

The questionnaire Introductory text explained the purpose of the study, assured confidentiality, and encouraged honest responses. Clear wording and logical sequencing were used to reduce misunderstanding and response fatigue.

3.4 Sampling and Target Population

The target population of the study consists of professionals working in supply chain management, logistics, procurement, operations, and sustainability-related roles. Respondents were required to have sufficient knowledge of their organization's supply chain practices in order to provide informed responses.

A non-probability convenience sampling approach was employed, as access to a comprehensive sampling frame was not feasible. The survey was distributed through professional networks, email contacts, and online platforms such as LinkedIn. While this sampling method may limit generalizability, it is commonly used in exploratory and applied supply chain research.

Convenience sampling is frequently used in postgraduate dissertation research where time and access constraints exist. Although it limits full statistical generalization, it remains useful for exploratory and explanatory studies seeking managerial insights.

A total of 100 valid responses were collected and included in the final analysis. This sample size was considered adequate for the statistical techniques applied, including descriptive analysis, correlation analysis, and multiple regression.

3.5 Data Analysis Methods

The collected data were analysed using statistical techniques. Initially, descriptive statistics were used to summarize the characteristics of the sample and examine the distribution of responses. Mean values and standard deviations provided insight into the general perceptions of participants. Reliability analysis was conducted to assess the internal consistency of multi-item constructs using Cronbach's alpha. Descriptive statistical techniques are widely used in quantitative research to summarize data distributions and support interpretation of respondent perceptions (Hair et al., 2019). Reliability assessment is an important step in quantitative research, as it evaluates the internal consistency and stability of measurement constructs prior to further statistical analysis (Kline, 2016).

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Correlation analysis was used to examine relationships between sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance. Multiple regression analysis was employed to assess the explanatory power of the independent variables on sustainability performance outcomes. Multiple regression analysis is considered appropriate for examining the predictive relationship between several independent variables and a single dependent variable within social science research. Regression analysis was suitable because it allows researchers to estimate the relative contribution of multiple predictors while controlling for the presence of other variables.

The statistical analysis was conducted using SPSS, which is widely used in social science and management research and provides robust tools for survey data analysis.

3.6 Ethical Considerations

Ethical principles were carefully considered throughout the research process. Participation in the survey was voluntary, and respondents were informed about the purpose of the study and the anonymous treatment of their responses. No personal identifying information was collected, and all data were stored securely and used exclusively for academic research purposes.

The study also sought to present findings honestly and transparently, without manipulation of data or misleading interpretation of results.

3.7 Summary

This chapter outlined the research methodology adopted in this dissertation, including the research design, data collection method, questionnaire structure, sampling approach, and data analysis techniques. The selected methodology provides a systematic and rigorous framework for empirically examining sustainability performance measurement and implementation in supply chains. The next chapter presents the results of the empirical analysis.

Chapter 4: Results and Data Analysis

4.1 Introduction

This chapter presents the results of the empirical analysis conducted to examine sustainability performance measurement and implementation in supply chains. The data were collected through a questionnaire-based survey and analysed using statistical techniques. The chapter begins with a descriptive analysis of the sample, followed by reliability analysis and examination of sustainability performance indicators, implementation enablers, and barriers. Finally, the relationships between the examined variables are analysed.

4.2 Sample Characteristics

This section presents the demographic and organizational characteristics of the survey respondents. Descriptive statistics were used to summarize information related to industry sector, company size, respondents' roles, and years of professional experience.

Industry sector
100 απαντήσεις

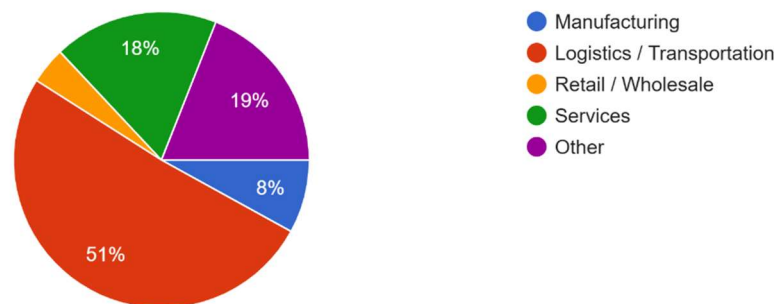


Table 4.1 presents the distribution of respondents by industry sector.

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Company size

100 απαντήσεις

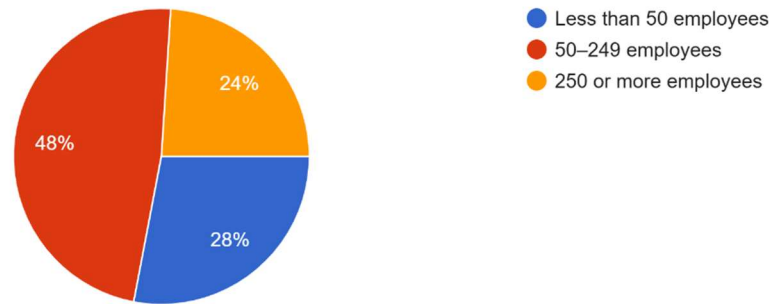


Table 4.2 summarizes company size.

Role

100 απαντήσεις

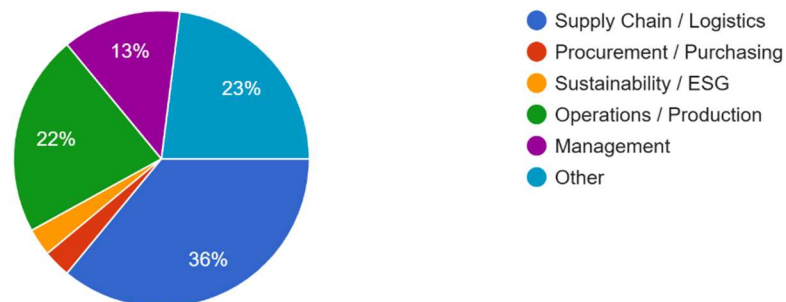


Table 4.3 presents respondents' professional roles.

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Years of experience
100 απαντήσεις

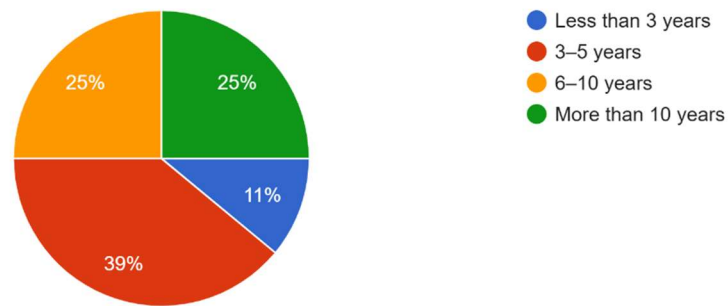


Table 4.4 summarizes years of experience.

The results indicate that the sample includes respondents from diverse industries and organizational backgrounds, ensuring a broad perspective on sustainability practices in supply chain management.

4.3 Reliability Analysis

To assess the internal consistency of the multi-item constructs used in the questionnaire, reliability analysis was conducted using Cronbach's alpha. The constructs examined include sustainability performance indicators, implementation enablers, implementation barriers, and overall sustainability performance.

Construct	Cronbach's Alpha	Number of Items	Reliability Level
Sustainability Measurement Practices (SMP)	0.937	9	Excellent
Sustainability Implementation Drivers (SID)	0.916	8	Excellent

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Sustainability Implementation Barriers (SIB)	0.815	8	Good
Sustainability Performance Outcomes (SPO)	0.899	5	Very Good

Table 4.5 presents the Cronbach's alpha values for each construct.

Source: Author's statistical analysis using SPSS.

The internal consistency of the measurement scales was assessed using Cronbach's alpha coefficient. The results indicate a high level of reliability across all constructs. Specifically, the sustainability measurement practices construct demonstrated excellent reliability ($\alpha = 0.937$), while sustainability implementation drivers also showed excellent internal consistency ($\alpha = 0.916$). The sustainability implementation barriers construct exhibited good reliability ($\alpha = 0.815$), and sustainability performance outcomes demonstrated very good reliability ($\alpha = 0.899$).

Overall, all constructs exceeded the recommended threshold of 0.70, indicating that the measurement scales used in this study are reliable and suitable for further statistical analysis (Bryman & Bell, 2011).

4.4 Descriptive Analysis of Sustainability Performance Indicators

Descriptive statistics were used to examine the extent to which organizations measure sustainability performance indicators in their supply chains. Mean values and standard deviations were calculated to assess the level of adoption of sustainability measurement practices.

Variable	Mean	Standard Deviation
Sustainability Measurement Practices	3.42	0.99

Table 4.6 presents the descriptive statistics for sustainability performance indicators.

Source: Author's statistical analysis using SPSS.

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Sustainability performance indicators are reflected through the measurement practices adopted by organizations within their supply chains. The descriptive analysis shows that sustainability measurement practices exhibit a relatively high mean value ($M = 3.42$, $SD = 0.99$), indicating that organizations moderately to actively measure sustainability-related aspects within their supply chains.

This suggests that companies are increasingly incorporating sustainability metrics such as environmental impact, resource efficiency, and supplier responsibility into their operational processes. However, the relatively higher standard deviation indicates some variability among respondents, implying that the level of adoption differs across organizations.

An interesting observation from the findings is that sustainability measurement appears to be more developed than the actual standardization of sustainability practices across organizations. While respondents generally reported moderate adoption of measurement indicators, the variation in responses suggests that organizations may differ significantly in how systematically such indicators are applied.

This may indicate that some firms measure sustainability primarily for reporting and compliance purposes, whereas others integrate sustainability metrics more deeply into operational decision-making processes. Consequently, the existence of sustainability indicators alone may not necessarily reflect the maturity of sustainability integration within the organization.

The findings may also imply that organizations are currently transitioning from informal sustainability awareness toward more structured performance management approaches. Such transition periods often produce inconsistencies in measurement practices, particularly where firms lack common industry benchmarks or standardized reporting frameworks.

Overall, the findings indicate that while sustainability measurement practices are present, there is still room for further development and standardization across firms.

4.5 Descriptive Analysis of Implementation Enablers

This section examines the perceived importance of factors enabling sustainability implementation in supply chains. Mean values reflect the degree to which respondents agree that specific factors support sustainability initiatives.

Variable	Mean	Standard Deviation
Sustainability Implementation Enablers	3.41	0.87

Table 4.7 presents the descriptive statistics for sustainability implementation enablers.

Source: Author's statistical analysis using SPSS.

The descriptive analysis of sustainability implementation enablers reveals a relatively high mean value ($M = 3.41$, $SD = 0.87$), suggesting that organizations generally possess the necessary conditions to support sustainability initiatives.

These enablers include factors such as top management commitment, strategic alignment, employee capabilities, and collaboration with supply chain partners. The relatively lower standard deviation compared to other constructs indicates a moderate level of agreement among respondents regarding the presence of these enabling factors.

The findings additionally suggest that implementation enablers may function as organizational stabilizers during sustainability transitions. In environments characterized by operational uncertainty or changing regulatory expectations, supportive internal conditions may help organizations maintain continuity in sustainability initiatives.

Another important implication is that implementation enablers are likely interconnected rather than isolated factors. For example, managerial commitment may influence employee engagement, while strategic alignment may strengthen interdepartmental coordination. Therefore, sustainability implementation may depend less on single initiatives and more on the overall organizational environment supporting change.

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The relatively balanced responses among participants may also indicate that sustainability is becoming increasingly institutionalized within organizational practices rather than remaining dependent on isolated managerial interest.

The results imply that organizations are increasingly aware of the importance of internal and external drivers in facilitating sustainability implementation, which aligns with the growing emphasis on strategic and managerial support in the literature.

4.6 Descriptive Analysis of Implementation Barriers

Descriptive statistics were also calculated to assess the extent to which various barriers hinder sustainability implementation.

Variable	Mean	Standard Deviation
Sustainability Implementation Barriers	3.42	0.65

Table 4.8 presents the descriptive statistics for sustainability implementation barriers.

Source: Author's statistical analysis using SPSS.

The descriptive analysis of sustainability implementation barriers indicates a moderate mean value ($M = 3.42$, $SD = 0.65$), suggesting that organizations experience a certain level of challenges when implementing sustainability practices.

These barriers may include high costs, data collection difficulties, supply chain complexity, and limited technological support. However, the relatively lower standard deviation suggests a more consistent perception among respondents regarding the existence of these barriers.

Despite the presence of such challenges, the moderate mean value indicates that barriers are not perceived as overwhelmingly restrictive, which may explain their limited impact on sustainability performance observed in the regression analysis.

A notable aspect of the findings is that respondents did not perceive implementation barriers as overwhelmingly severe despite acknowledging their existence. This may suggest that

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sustainability-related challenges are increasingly viewed as operational realities that organizations expect and learn to manage over time.

The results may further indicate that barriers alone are insufficient to explain differences in sustainability performance. Some organizations may experience significant barriers but still achieve relatively strong outcomes due to stronger internal capabilities, leadership support, or strategic prioritization.

This interpretation highlights the importance of examining sustainability implementation through a multidimensional perspective rather than assuming that barriers automatically prevent organizational progress.

4.7 Descriptive Analysis of Sustainability Performance

Descriptive statistics were also calculated to assess overall sustainability performance.

Variable	Mean	Standard Deviation
Sustainability Performance	3.59	0.80

Table 4.9 presents the descriptive statistics for sustainability performance.

Source: Author's statistical analysis using SPSS.

The descriptive analysis shows that sustainability performance exhibits the highest mean value among all constructs ($M = 3.59$, $SD = 0.80$), indicating a generally positive perception of sustainability outcomes among the surveyed organizations.

This suggests that, despite the presence of implementation challenges, organizations perceive their sustainability performance as relatively strong. The moderate standard deviation indicates some variation in performance levels, reflecting differences in organizational maturity and practices.

The comparatively higher sustainability performance scores may also reflect a growing alignment between sustainability objectives and broader organizational priorities. Rather than

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treating sustainability as a separate activity, some organizations may increasingly integrate sustainability considerations into procurement, operations, logistics, and strategic planning processes.

At the same time, the findings should be interpreted cautiously. Positive sustainability perceptions do not necessarily guarantee equally strong objective performance outcomes. Since the analysis relies on self-reported responses, perceptions of sustainability success may differ from independently verified performance measurements.

Nevertheless, the results indicate that sustainability is becoming more visible within organizational evaluation processes, suggesting a gradual shift toward more structured sustainability management approaches across supply chains.

Overall, the descriptive results provide an initial indication that sustainability practices and enabling factors are present across organizations, supporting further analysis through correlation and regression.

4.8 Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships between sustainability performance indicators, implementation enablers, barriers, and overall sustainability performance.

Variables	SMP	SID	SIB	SPO
Sustainability Measurement Practices (SMP)	1	0.801**	0.210*	0.678**
Sustainability Implementation Drivers (SID)	0.801**	1	0.251*	0.737**
Sustainability Implementation Barriers (SIB)	0.210*	0.251*	1	0.237*

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Sustainability Performance (SPO)	0.678**	0.737**	0.237*	1
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** Correlation is significant at the 0.01 level (2-tailed).

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

Table 4.10 presents the correlation matrix.

Source: Author's statistical analysis using SPSS.

The correlation analysis indicates that sustainability performance is more closely associated with proactive organizational capabilities than with the mere absence of implementation challenges. In particular, the relatively strong relationships observed between sustainability performance and both sustainability measurement practices and implementation drivers suggest that organizations benefiting from structured managerial support and performance monitoring systems are more likely to achieve favourable sustainability outcomes.

The stronger correlation observed for implementation drivers may imply that organizational conditions such as leadership commitment, strategic coordination, and internal alignment play a more influential role than technical measurement mechanisms alone. This finding supports the view that sustainability performance is not generated solely through measurement systems, but through the broader organizational environment in which sustainability initiatives are implemented.

An additional point of interest is the relatively weak positive correlation identified between implementation barriers and sustainability performance. Although barriers are traditionally expected to negatively affect sustainability outcomes, the findings may suggest that organizations with more advanced sustainability initiatives become increasingly aware of operational complexities and implementation difficulties as sustainability efforts mature.

This interpretation may explain why barriers remain statistically associated with sustainability performance without necessarily preventing positive outcomes. In practice, organizations pursuing more ambitious sustainability objectives may simultaneously experience higher implementation complexity, supplier coordination challenges, and reporting requirements.

4.9 Regression Analysis

To further examine the impact of implementation enablers and barriers on overall sustainability performance, regression analysis was conducted.

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.753	0.567	0.554	0.53239

Table 4.11 presents the Model Summary

Model	Sum of Squares	dF	Mean Square	F	Sig.
Regression	35.656	3	11.885	41.933	<0.001
Residual	27.210	96	0.283		
Total	62.866	99			

Dependent Variable: Sustainability Performance (SPO)

Table 4.12 presents ANOVA results

Variables	B	Standard Error	Beta	t	Sig.
Constant	1.060	0.319		3.320	0.001
Sustainability Measurement Practices (SMP)	0.195	0.089	0.244	2.179	0.032
Sustainability Implementation Drivers (SID)	0.482	0.103	0.528	4.657	<0.001
Sustainability Implementation Barriers (SIB)	0.065	0.084	0.053	0.764	0.447

Dependent Variable: Sustainability Performance (SPO)

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Table 4.13 presents Regression Coefficients

Source: Author's statistical analysis using SPSS.

A multiple regression analysis was conducted to examine the impact of sustainability measurement practices, implementation drivers, and implementation barriers on sustainability performance.

The overall model was statistically significant ($F = 41.933$, $p < 0.001$) and explained 56.7% of the variance in sustainability performance ($R^2 = 0.567$), indicating a strong explanatory power.

The results show that sustainability implementation drivers have a strong and statistically significant positive effect on sustainability performance ($\beta = 0.528$, $p < 0.001$), suggesting that factors such as top management commitment, strategic alignment, and collaboration are critical determinants of sustainability outcomes.

Sustainability measurement practices also have a positive and statistically significant effect on sustainability performance ($\beta = 0.244$, $p = 0.032$), indicating that organizations that actively measure sustainability indicators tend to achieve better performance.

In contrast, sustainability implementation barriers do not have a statistically significant effect on sustainability performance ($\beta = 0.053$, $p = 0.447$), suggesting that perceived barriers may not directly hinder sustainability outcomes.

4.10 Summary of Results

This chapter presented the results of the empirical analysis, including descriptive statistics, reliability assessment, and examination of relationships between key variables. The findings provide empirical evidence on sustainability performance measurement practices, key enablers, and major barriers in supply chain management. These results form the basis for the discussion presented in the following chapter.

Chapter 5: Discussion

5.1 Introduction

This chapter discusses the findings of the empirical analysis in relation to the research objectives and existing literature. The aim of this study was to examine sustainability performance measurement and to identify the key factors influencing the implementation of sustainable practices in supply chains. The results are interpreted in light of prior research on sustainable supply chain management and provide insights into the relative importance of sustainability measurement practices, implementation drivers, and barriers.

5.2 Sustainability Measurement Practices and Performance

The results of the correlation and regression analysis indicate that sustainability measurement practices have a positive and statistically significant effect on sustainability performance. Specifically, the findings demonstrate a strong positive correlation between measurement practices and performance, as well as a significant positive regression coefficient.

This finding suggests that organizations that actively measure sustainability indicators such as carbon emissions, energy consumption, and supplier social responsibility are more likely to achieve higher sustainability performance. These results are consistent with existing literature, which emphasizes the importance of performance measurement systems in supporting decision-making and continuous improvement in supply chains.

The use of structured sustainability indicators allows organizations to monitor progress, identify inefficiencies, and implement targeted improvements. Therefore, measurement practices can be seen as a critical mechanism for translating sustainability strategies into operational outcomes.

The findings of the study indicate that sustainability measurement practices are positively associated with sustainability performance. This suggests that organizations which systematically monitor sustainability indicators are more likely to achieve stronger environmental, social, and

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operational outcomes. Measurement systems allow managers to identify inefficiencies, track progress, allocate resources effectively, and ensure accountability across supply chain activities.

This result is consistent with prior literature which argues that what gets measured is more likely to be managed effectively. Sustainability metrics convert broad strategic intentions into measurable operational targets. For example, firms may monitor supplier compliance, waste generation, energy usage, transport emissions, recycling rates, and ethical sourcing practices. Through regular monitoring, organizations can identify areas requiring corrective action and continuous improvement.

The relatively positive mean values found in the descriptive analysis suggest that many organizations in the sample have already adopted at least moderate levels of sustainability measurement. This may reflect growing awareness of ESG expectations, customer pressure, and stakeholder demand for transparent reporting practices.

From a managerial perspective, the result highlights that sustainability measurement should not be treated as an administrative exercise. Instead, it should be integrated into performance management systems, procurement processes, supplier evaluation mechanisms, and strategic planning routines. Organizations that rely solely on informal sustainability intentions without measurable indicators may struggle to convert commitments into outcomes.

5.3 Sustainability Implementation Drivers

The analysis reveals that sustainability implementation drivers have the strongest positive effect on sustainability performance among all examined variables. The regression results indicate a highly significant and substantial impact, highlighting the central role of enabling factors in achieving sustainability outcomes.

This finding confirms the importance of internal and external drivers identified in the literature, including top management commitment, strategic alignment, employee competencies, technological support, and collaboration with supply chain partners. Among these, managerial

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commitment and strategic orientation are often emphasized as key determinants of successful sustainability implementation.

The strong influence of implementation drivers suggests that sustainability performance is not only a matter of adopting measurement systems but also depends heavily on organizational readiness and support. Organizations that invest in capabilities, align sustainability with their strategic objectives, and foster collaboration are better positioned to achieve meaningful sustainability outcomes.

The results also show that sustainability implementation drivers have a positive relationship with sustainability performance. This indicates that enabling conditions within and around the organization play an important role in determining whether sustainability initiatives succeed.

Implementation drivers may include top management commitment, employee engagement, strategic alignment, regulatory awareness, customer expectations, technological readiness, and collaboration with supply chain partners. Where such drivers are present, sustainability programmes are more likely to receive adequate resources, managerial attention, and organizational legitimacy.

This finding supports previous studies which emphasize the importance of leadership commitment in sustainability transformation. Senior management often determines budgets, sets priorities, communicates values, and creates accountability systems. Without visible leadership support, sustainability initiatives may remain fragmented or symbolic.

The findings further imply that sustainability performance is not generated solely through technical systems or isolated policies. Rather, it depends on organizational readiness and the presence of supportive cultural and structural conditions. Managers should therefore invest not only in technology and reporting systems, but also in training, communication, incentives, and cross-functional coordination.

5.4 Sustainability Implementation Barriers

Contrary to expectations, the results indicate that sustainability implementation barriers do not have a statistically significant effect on sustainability performance. Although the correlation

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analysis shows a weak positive relationship, the regression results suggest that barriers do not play a decisive role in explaining sustainability outcomes.

This finding may appear counterintuitive, as prior research often highlights barriers such as high costs, data limitations, and supply chain complexity, as significant obstacles to sustainability implementation. However, several explanations can account for this result.

First, organizations that are actively engaged in sustainability may be more aware of existing barriers but are also better equipped to manage them effectively. Second, the presence of barriers does not necessarily prevent organizations from achieving sustainability performance if strong enabling factors are in place. Finally, it is possible that respondents perceive barriers as challenges rather than constraints, especially in more mature or advanced organizations.

This result suggests that the role of barriers may be more nuanced than previously assumed and that their impact may depend on the presence of strong implementation drivers.

The relationship between sustainability implementation barriers and sustainability performance appears weaker than that of measurement practices and implementation drivers. This suggests that while barriers exist, they may not be sufficiently strong to completely prevent organizations from pursuing sustainability objectives.

Common barriers identified in the literature include financial constraints, lack of expertise, supplier resistance, insufficient data quality, limited transparency, and operational complexity. However, many organizations may have developed coping mechanisms that reduce the negative impact of such obstacles. For example, firms may phase investments over time, prioritize high-impact projects, or collaborate with key suppliers to address capability gaps.

Another explanation is that barriers do not affect all firms equally. Larger organizations may possess greater financial and technological resources, while smaller firms may rely on flexibility and informal decision-making. As a result, the average statistical effect of barriers may appear weaker across a mixed sample.

Although barriers may not have shown a strong direct effect, they should not be ignored. In practice, persistent barriers can slow implementation speed, reduce consistency, and limit long-

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term progress. Managers should therefore continue addressing cost concerns, training gaps, and supplier engagement challenges.

5.5 Comparison with Existing Literature

The findings of this study are broadly aligned with the growing body of literature on sustainable supply chain management. Previous research has frequently reported positive links between sustainable supply chain management practices and organizational performance outcomes (Carter & Rogers, 2008; Seuring & Müller, 2008; Zhu et al., 2013), particularly where sustainability is embedded into managerial systems and strategic processes.

The positive influence of sustainability measurement practices supports studies by Hassini et al. (2012), Taticchi et al. (2013), and Saeed and Kersten (2019), which emphasize the importance of sustainability metrics and performance monitoring systems, supplier scorecards, balanced scorecards, and ESG dashboards for monitoring progress and improving accountability.

Similarly, the positive role of implementation drivers is consistent with findings reported by Sajjad et al. (2020), Sharma and Henriques (2005), and Lerman et al. (2022), who highlight the importance of managerial commitment, stakeholder pressure, and organizational readiness in facilitating sustainability implementation. The present findings reinforce the argument that sustainability success is strongly dependent on organizational context.

The weaker impact of implementation barriers is also partially aligned with studies by Menon and Ravi (2022) and Jia et al. (2018), which suggest that although barriers create operational difficulties, organizations may still improve sustainability performance through capability development and strategic adaptation, innovation, learning, and gradual capability development. Therefore, barriers may delay progress rather than fully determine outcomes.

This multidimensional perspective extends previous SSCM research by simultaneously examining sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance within a unified empirical framework. Overall, the present study contributes to the literature by examining measurement practices, drivers, and barriers

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simultaneously within a single empirical framework. This multidimensional perspective provides a more balanced understanding of the factors shaping sustainability performance.

5.6 Managerial Implications

The findings of this study have important implications for practitioners and for managers seeking to improve sustainability performance across supply chains. First, organizations should prioritize the development of sustainability measurement systems to support data-driven decision-making. Implementing clear and consistent sustainability indicators enables organizations to monitor performance and identify improvement opportunities. Additionally, organizations should develop formal sustainability measurement systems with clear indicators linked to environmental, social, and operational priorities. These indicators should be reviewed regularly and embedded into management reporting routines.

Second, managers should focus on strengthening key implementation drivers, particularly leadership commitment, strategic integration, and collaboration across the supply chain. These factors have the greatest impact on sustainability performance and should be considered critical success factors. Leadership commitment remains essential. Senior managers should visibly support sustainability initiatives, allocate resources, communicate expectations, and ensure accountability across departments.

While barriers should not be ignored, the results suggest that organizations can achieve strong sustainability performance even in the presence of challenges, provided that sufficient enabling mechanisms are in place.

Third, collaboration with suppliers should be strengthened. Since many sustainability impacts occur outside the focal organization, firms should engage suppliers through joint targets, training programmes, audits, and information sharing mechanisms.

Fourth, organizations should adopt digital tools where possible. Data analytics, ERP systems, dashboards, and traceability technologies can improve sustainability visibility and decision-making quality.

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Finally, managers should view barriers as manageable challenges rather than reasons for inaction. Incremental progress, pilot projects, and phased implementation strategies can allow firms to advance sustainability objectives even under resource constraints.

5.7 Summary

This chapter analysed and interpreted the empirical findings of the study in relation to the research objectives and existing sustainable supply chain management literature. The discussion demonstrated that sustainability performance is influenced more strongly by proactive organizational practices and enabling conditions than by the existence of implementation challenges alone.

The findings revealed that sustainability measurement practices are positively associated with sustainability performance, indicating that organizations which systematically monitor sustainability-related indicators are more likely to achieve stronger sustainability outcomes. The results suggest that measurement systems may contribute not only to performance monitoring, but also to greater organizational accountability, strategic alignment, and operational visibility across supply chain activities.

The analysis further showed that sustainability implementation drivers exhibit the strongest relationship with sustainability performance among all examined constructs. This highlights the importance of organizational readiness, leadership support, strategic coordination, employee engagement, and collaboration with supply chain partners in facilitating sustainability initiatives. The findings imply that sustainability performance depends significantly on the broader organizational environment within which sustainability practices are implemented.

In contrast, implementation barriers demonstrated a comparatively weaker relationship with sustainability performance. Although barriers such as financial constraints, operational complexity, technological limitations, and data-related challenges remain present, the results suggest that such obstacles may not necessarily prevent organizations from achieving positive sustainability outcomes. A possible explanation is that organizations with more advanced

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sustainability practices may simultaneously become more aware of implementation complexities while continuing to progress through stronger managerial capabilities and support systems.

The chapter also demonstrated that the findings of the study are generally consistent with existing literature emphasizing the importance of sustainability integration, performance measurement systems, and organizational support mechanisms. At the same time, the results provide additional insight into the relatively complex role of implementation barriers, suggesting that barriers alone may not adequately explain variations in sustainability performance across organizations.

Overall, the findings reinforce the view that sustainable supply chain management should be approached as a multidimensional and strategically integrated process rather than as a set of isolated operational initiatives. The chapter therefore provides a foundation for the concluding discussion, managerial implications, limitations, and future research directions presented in the following chapter.

Chapter 6: Conclusions and Future Research

6.1 Summary of the Study

This final chapter summarizes the main findings of the dissertation, outlines the practical implications of the results, acknowledges the limitations of the study, and proposes directions for future research. The purpose of the study was to examine how sustainability measurement practices, implementation drivers, and implementation barriers influence sustainability performance within supply chains. This dissertation examined sustainability performance measurement and implementation in supply chains, focusing on sustainability performance indicators, implementation enablers, and barriers. The study adopted a quantitative research approach using a questionnaire-based survey targeting 100 professionals involved in supply chain and sustainability-related roles. By integrating performance measurement with implementation conditions, the study aimed to provide a comprehensive understanding of sustainability practices in supply chain management.

The literature review highlighted the growing importance of sustainable supply chain management and emphasized persistent challenges related to measurement and implementation. Building on these insights, the empirical part of the study was designed to capture organizational practices and perceptions regarding sustainability performance and implementation.

The results indicate that sustainability performance is strongly influenced by organizational factors, particularly implementation drivers and measurement practices. The regression analysis demonstrated that sustainability implementation drivers have the strongest positive effect on sustainability performance, followed by sustainability measurement practices. In contrast, sustainability implementation barriers were found to have no statistically significant effect.

These findings suggest that organizations can achieve high levels of sustainability performance when they invest in internal capabilities and strategic alignment, even in the presence of operational challenges.

6.2 Theoretical Contributions

This study contributes to the growing body of literature on sustainable supply chain management by providing empirical evidence regarding the relationships between sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance. While previous studies have frequently examined these dimensions separately, the present research adopts a more integrated approach by analysing their combined influence within a single quantitative framework.

One of the primary theoretical contributions of the study lies in its emphasis on the role of enabling organizational conditions in shaping sustainability outcomes. The findings suggest that sustainability performance is influenced more strongly by proactive managerial and organizational capabilities than by the mere existence of implementation barriers. This contributes to existing discussions within the literature by supporting the argument that sustainability success depends not only on reducing obstacles, but also on strengthening organizational readiness, leadership support, strategic coordination, and performance monitoring systems.

The study further contributes to the literature by highlighting the importance of sustainability measurement practices as a strategic management mechanism rather than simply a reporting activity. The findings indicate that organizations using structured sustainability indicators and monitoring systems tend to demonstrate stronger sustainability performance. This supports theoretical perspectives suggesting that performance measurement systems play an important role in translating sustainability objectives into operational practices and measurable outcomes. Another contribution of the study concerns the relatively weaker relationship identified between implementation barriers and sustainability performance. Existing literature often presents barriers primarily as restrictive forces that hinder sustainability adoption. However, the present findings suggest a more nuanced interpretation. The results imply that organizations may continue achieving positive sustainability outcomes despite operational, financial, or technological challenges, particularly where supportive internal conditions and managerial commitment are present. This perspective contributes to a more balanced understanding of sustainability implementation processes and highlights the importance of organizational adaptability and capability development.

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In addition, the study contributes methodologically by applying a quantitative empirical approach to examine sustainability-related constructs simultaneously through descriptive analysis, correlation analysis, and regression analysis. The use of an integrated statistical framework allows for a more comprehensive examination of the relative explanatory influence of different sustainability-related variables.

The findings also reinforce the multidimensional nature of sustainable supply chain management. Rather than treating sustainability as a purely environmental issue, the study supports broader theoretical perspectives emphasizing the integration of managerial, operational, strategic, and organizational dimensions within sustainability implementation processes. Overall, the study contributes to the ongoing development of sustainable supply chain management research by offering empirical evidence that sustainability performance is shaped through the interaction of measurement systems, enabling organizational conditions, and implementation realities. The findings therefore support the view that sustainability should be understood as a strategically embedded organizational capability rather than as a standalone operational initiative.

6.3 Managerial Implications

The findings of the study demonstrate that sustainability has become an increasingly relevant priority within supply chain management. Organizations are no longer focused exclusively on cost efficiency and operational speed, but are also paying greater attention to environmental responsibility, social accountability, and long-term resilience.

A key conclusion of the study is that sustainability measurement practices positively support sustainability performance. Organizations that monitor relevant sustainability indicators are better positioned to identify weaknesses, improve processes, and align operational behaviour with strategic sustainability goals. Measurement systems therefore act as an important managerial mechanism for turning sustainability intentions into measurable outcomes.

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The results also indicate that sustainability implementation drivers positively influence sustainability performance. Factors such as leadership commitment, employee engagement, strategic alignment, regulatory awareness, and collaboration with supply chain partners create favourable conditions for successful sustainability initiatives.

In contrast, implementation barriers demonstrated a weaker effect on sustainability performance. This does not mean barriers are absent, but rather that many organizations may be learning to manage or reduce their negative influence through gradual capability development, innovation, and stronger governance practices.

Overall, the study supports the view that sustainability performance is shaped more strongly by proactive managerial practices and enabling conditions than by barriers alone.

The findings offer several implications for supply chain managers and decision-makers. Understanding which sustainability performance indicators are most widely used can help organizations improve their measurement systems and align sustainability objectives with operational decisions. Additionally, identifying key enablers highlights the importance of managerial commitment, strategic alignment, and collaboration with supply chain partners. Organizations should prioritize the development and use of sustainability measurement systems, as these are positively associated with improved performance.

At the same time, recognizing common implementation barriers enables organizations to proactively address challenges such as high costs, data limitations, and operational complexity. By addressing these issues, managers can enhance the effectiveness of sustainability initiatives and achieve improved long-term performance.

Finally, while barriers such as costs and complexity exist, they do not necessarily prevent organizations from achieving sustainability performance. This suggests that organizations should adopt a proactive approach and focus on building capabilities rather than being constrained by perceived challenges.

6.4 Limitations of the Study

Despite the contributions of the study, several limitations should be acknowledged when interpreting the findings. First, the study adopted a cross-sectional research design, meaning that data were collected at a single point in time. While this approach was appropriate for examining relationships between variables within the available timeframe, it limits the ability to assess how sustainability practices, organizational capabilities, and performance outcomes evolve over time. Sustainable supply chain management is a dynamic process influenced by changing market conditions, regulatory developments, technological advancements, and organizational learning. Consequently, longitudinal research designs may provide deeper insight into the long-term development and effectiveness of sustainability initiatives.

A second limitation concerns the use of self-reported questionnaire data. The findings are based on respondents' perceptions and evaluations of sustainability practices and organizational performance rather than independently verified operational data. As a result, responses may be influenced by subjective interpretation, social desirability bias, or differences in individual understanding of sustainability-related concepts. Such limitations are commonly associated with self-reported survey research and may contribute to common method bias within behavioural and organizational studies. Some respondents may also overestimate the effectiveness of sustainability practices within their organizations, particularly where sustainability is viewed positively from a reputational perspective.

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The use of convenience sampling also represents an important limitation. Due to practical and accessibility constraints, respondents were selected based on availability rather than through probability-based sampling methods. Although convenience sampling is commonly applied in postgraduate research and exploratory business studies, it may reduce the representativeness of the sample and limit the generalizability of the findings to wider populations or specific industries.

Another limitation relates to sample size and diversity. While the sample was sufficient for the statistical analyses conducted, a larger sample covering a broader range of industries, organizational sizes, and geographical regions could potentially produce more robust and generalizable findings. Sustainability priorities and implementation challenges may vary considerably across sectors and national contexts.

In addition, the study focused primarily on quantitative analysis and therefore may not fully capture the complexity of managerial decision-making processes related to sustainability implementation. Qualitative methods such as interviews or case studies could provide deeper understanding of organizational behaviour, internal challenges, and strategic sustainability integration processes.

Finally, the study examined a selected number of variables associated with sustainability performance. Although sustainability measurement practices, implementation drivers, and implementation barriers were found to be significant dimensions, other potentially influential factors such as organizational culture, innovation capability, digital transformation, supply chain resilience, and external stakeholder pressure were not examined directly within the model. Despite these limitations, the study provides meaningful empirical insights into sustainable supply chain management practices and contributes to the broader understanding of factors associated with sustainability performance within organizational supply chains.

6.5 Directions for Future Research

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The findings of this study provide several opportunities for future research in the field of sustainable supply chain management. Although the present dissertation examined the relationships between sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance through a quantitative cross-sectional approach, additional research may further expand understanding of how sustainability capabilities develop and operate within different organizational contexts.

One important direction for future research involves the use of longitudinal research designs. Sustainability implementation is not a static process, but rather an evolving organizational capability influenced by changes in regulation, technology, stakeholder expectations, and market conditions. Longitudinal studies could therefore provide deeper insight into how sustainability practices mature over time and how organizations adapt their strategies in response to emerging sustainability challenges and opportunities.

Future studies could also conduct comparative research across industries, sectors, and geographical regions. Sustainability priorities and implementation conditions may differ significantly between manufacturing, logistics, retail, healthcare, energy, and service industries. Similarly, regulatory frameworks, cultural factors, economic conditions, and stakeholder expectations may vary across countries and regions. Comparative studies could therefore help identify context-specific sustainability drivers and barriers as well as industry-specific implementation patterns.

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Another valuable direction for future research concerns organizational size and supply chain structure. Large multinational corporations may possess greater financial resources, technological capabilities, and formal sustainability systems compared to SMEs, which often face greater resource constraints. Examining these differences could provide more nuanced understanding of how sustainability strategies are implemented across different organizational environments. Future research may also benefit from incorporating qualitative methods such as interviews, case studies, or focus groups. While quantitative methods are effective for identifying statistical relationships between variables, qualitative approaches may provide richer insight into managerial decision-making processes, organizational culture, employee attitudes, and implementation experiences. Such methods could help explain why some organizations achieve stronger sustainability outcomes despite facing similar operational challenges.

In addition, future studies could examine a broader range of variables associated with sustainability performance. Factors such as digital transformation, supply chain resilience, innovation capability, organizational culture, stakeholder pressure, ESG governance mechanisms, and technological integration may further influence sustainability outcomes and implementation effectiveness.

Researchers may also apply more advanced analytical techniques such as structural equation modelling (SEM), mediation analysis, moderation analysis, or multi-level modelling to examine more complex relationships between sustainability-related variables. Such approaches could help identify indirect effects, interaction effects, and underlying mechanisms influencing sustainability performance.

Another potential research direction involves examining objective sustainability performance indicators rather than relying solely on perceptual survey responses. Future studies could integrate operational sustainability data such as carbon emissions, waste reduction levels, energy consumption, supplier audit scores, or ESG ratings to strengthen empirical robustness and improve measurement accuracy.

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Finally, future research could explore the relationship between sustainability and emerging supply chain challenges such as geopolitical disruption, climate risk, artificial intelligence integration, digital supply chain visibility, and circular economy transitions. As global supply chains become increasingly complex and interconnected, sustainability research will continue to play an important role in understanding how organizations can achieve both resilience and long-term value creation.

Overall, the present study provides a foundation for future empirical and theoretical research on sustainable supply chain management and highlights the continuing importance of sustainability integration within modern organizational and supply chain environments.

6.6 Final Remarks

Sustainability has evolved from a peripheral organizational concern into a central strategic priority within modern supply chain management. Increasing environmental pressures, stakeholder expectations, regulatory requirements, and global supply chain disruptions have intensified the need for organizations to adopt more sustainable and resilient operational practices. As a result, sustainability is no longer viewed solely as a matter of corporate responsibility, but increasingly as a factor linked to long-term competitiveness, organizational reputation, operational efficiency, and business continuity.

This dissertation sought to examine the relationships between sustainability measurement practices, implementation drivers, implementation barriers, and sustainability performance within supply chains. Through the use of quantitative empirical analysis, the study provided evidence that sustainability performance is influenced not only by the existence of sustainability initiatives, but also by the organizational conditions supporting their implementation. The findings highlighted the importance of sustainability measurement systems in supporting organizational visibility, accountability, and strategic alignment. Organizations that actively monitor sustainability-related indicators appear more capable of integrating sustainability considerations into operational and managerial decision-making processes. At the same time, the results demonstrated that implementation drivers such as leadership commitment, strategic

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coordination, employee engagement, and collaboration with supply chain partners play a particularly important role in supporting sustainability performance.

An important insight emerging from the study is that implementation barriers, although present, may not necessarily prevent organizations from pursuing sustainability objectives successfully. Rather than functioning solely as restrictive forces, barriers may represent operational challenges that organizations increasingly learn to manage through capability development, organizational learning, technological investment, and stronger managerial support systems. The dissertation also reinforces the multidimensional nature of sustainable supply chain management. Sustainability performance cannot be explained exclusively through environmental initiatives or isolated operational practices. Instead, sustainability outcomes appear to emerge through the interaction of measurement systems, organizational culture, strategic priorities, managerial capabilities, and collaborative supply chain relationships.

From a practical perspective, the study offers insights that may assist organizations in strengthening sustainability integration within their supply chain operations. Managers may benefit from adopting more structured sustainability measurement frameworks, investing in internal organizational support mechanisms, and improving collaboration across supply chain networks. The findings also emphasize the importance of viewing sustainability as a long-term strategic process rather than as a short-term compliance or reporting exercise.

Overall, the dissertation contributes to the broader understanding of sustainable supply chain management by providing empirical evidence on factors associated with sustainability performance. In an increasingly complex and uncertain global business environment, organizations that successfully integrate sustainability into their supply chain strategies are likely to be better positioned to achieve operational resilience, stakeholder trust, and long-term organizational value.

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Appendix

Item	Mean	Standard Deviation
SMP1	3.19	1.331
SMP2	3.20	1.263
SMP3	3.13	1.220 1.220
SMP4	3.55	1.209
SMP5	3.96	1.205
SMP6	3.47	1.243
SMP7	3.53	1.141
SMP8	3.47	1.210
SMP9	3.26	1.228

Table 1 Sustainability Measurement Practices Items

Item	Mean	Standard Deviation
SID1	3.48	1.096
SID2	3.37	1.143
SID3	3.28	1.006
SID4	3.23	1.179
SID5	3.48	1.259
SID6	3.46	0.999
SID7	3.55	1.114
SID8	3.43	0.977

Table 2 Sustainability Implementation Drivers Items

Item	Mean	Standard Deviation
SIB1	3.35	1.029

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SIB2	3.51	0.959
SIB3	3.52	0.822
SIB4	3.39	0.984
SIB5	3.49	1.087
SIB6	3.40	1.015
SIB7	3.37	0.928
SIB8	3.30	1.087

Table 3 Sustainability Implementation Barriers Items

Item	Mean	Standard Deviation
SPO1	3.42	0.997
SPO2	3.60	0.910
SPO3	3.62	0.951
SPO4	3.70	0.905
SPO5	3.60	0.953

Table 4 Sustainability Performance Items

Source: Author's statistical analysis using SPSS.

Appendix A: Detailed Descriptive Statistics of Survey Items

Sustainability Performance in Supply Chains

This questionnaire is conducted as part of a Master's dissertation examining sustainability performance in supply chains. The purpose of the study is to explore how organizations measure sustainability and what factors influence the implementation of sustainable supply chain practices.

Participation in this survey is voluntary. All responses are anonymous and will be used exclusively for academic research purposes. No personally identifiable information will be collected, and the data will be analyzed only in aggregated form.

The questionnaire takes approximately **5–7 minutes** to complete.

By proceeding with the survey, you confirm that you voluntarily agree to participate in this study.

d.yosma18@gmail.com [Εναλλαγή λογαριασμού](#)



 Δεν κοινοποιήθηκε

* Υποδεικνύει απαιτούμενη ερώτηση

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Please answer the following statements using the scale below:

1 = Strongly disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly agree

Ημερομηνία

dd/mm/yyyy 

Respondent and Company Profile

Industry sector *

- ☐ Manufacturing
- ☐ Logistics / Transportation
- ☐ Retail / Wholesale
- ☐ Services
- ☐ Other

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Company size *

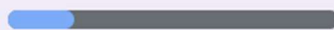
- ☐ Less than 50 employees
- ☐ 50–249 employees
- ☐ 250 or more employees

Role *

- ☐ Supply Chain / Logistics
- ☐ Procurement / Purchasing
- ☐ Sustainability / ESG
- ☐ Operations / Production
- ☐ Management
- ☐ Other

Years of experience *

- ☐ Less than 3 years
- ☐ 3–5 years
- ☐ 6–10 years
- ☐ More than 10 years

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Sustainability Measurement Practices					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
★ My organization measures carbon emissions related to transportation and logistics.	☐	☐	☐	☐	☐
My organization monitors energy consumption in supply chain operations.	☐	☐	☐	☐	☐
My organization tracks waste generation and recycling rates in the supply chain.	☐	☐	☐	☐	☐
My organization measures the use of environmentally friendly or recyclable	☐	☐	☐	☐	☐

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packaging.

My organization monitors compliance with health and safety standards across the supply chain.

☐☐☐☐☐

My organization evaluates suppliers based on social responsibility and ethical labor practices.

☐☐☐☐☐

My organization assesses cost efficiency achieved through sustainable practices.

☐☐☐☐☐

My organization uses formal sustainability performance indicators to support decision-making.

☐☐☐☐☐

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My organization regularly reports sustainability metrics internally or externally (e.g., sustainability reports, ESG reporting).

☐ ☐ ☐ ☐ ☐

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φόρμας

Sustainability Implementation Drivers

*

Strongly
disagree

Disagree

Neutral

Agree

Strongly
agree

Top management is strongly committed to sustainability initiatives.

☐ ☐ ☐ ☐ ☐

My organization has a clear sustainability strategy related to supply chain activities.

☐ ☐ ☐ ☐ ☐

Employees have adequate knowledge and skills to support sustainability initiatives.

☐ ☐ ☐ ☐ ☐

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My organization has access to reliable data for measuring sustainability performance.	☐	☐	☐	☐	☐
Digital technologies support sustainability monitoring and reporting.	☐	☐	☐	☐	☐
Collaboration with suppliers supports sustainability implementation.	☐	☐	☐	☐	☐
Regulatory requirements encourage sustainability practices.	☐	☐	☐	☐	☐
Customer demand motivates sustainability adoption.	☐	☐	☐	☐	☐

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Sustainability Implementation Barriers					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
* High implementation and investment costs limit sustainability initiatives.	☐	☐	☐	☐	☐
Difficulty in collecting accurate sustainability data is a major challenge.	☐	☐	☐	☐	☐
Supply chain complexity hinders sustainability implementation.	☐	☐	☐	☐	☐

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Limited cooperation from suppliers restricts sustainability efforts.	☐	☐	☐	☐	☐
Lack of appropriate technological systems limits sustainability measurement.	☐	☐	☐	☐	☐
Employees lack sufficient training in sustainability practices.	☐	☐	☐	☐	☐
Sustainability objectives conflict with short-term financial goals.	☐	☐	☐	☐	☐
Limited top-management attention restricts sustainability initiatives.	☐	☐	☐	☐	☐

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Sustainability Performance Outcomes

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our organization performs well in managing environmental sustainability.	☐	☐	☐	☐	☐
Our organization performs well in managing social sustainability.	☐	☐	☐	☐	☐
Our organization performs well in managing economic sustainability.	☐	☐	☐	☐	☐
Our sustainability performance has improved over the past three years.	☐	☐	☐	☐	☐

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Our organization's sustainability initiatives contribute positively to overall organizational competitiveness.

☐ ☐ ☐ ☐ ☐

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Appendix B: Questionnaire

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