

**The Effect of Sustainable Supply Chain Management
on Environmental Performance: Applied on Fuel
Stations in KSA**

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Abstract:

the current research aimed to determine the impact of economic sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia, determine the impact of Environmental sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia and determine the impact of Social sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia. The independent variable is sustainable supply chains management (Economic sustainability, Environmental sustainability, and Social sustainability) and dependent variable is environmental performance.

Thus, how does sustainable supply chain management affect the environmental performance of retail petrol stations in Saudi Arabia is the current study's main issue. This is what the study's issue is. The issue at hand is understandable given the impact it currently has and will continue to have on retail fuel stations, society at large, and other relevant parties if it is not resolved.

The results illustrate the strong positive correlation between the basic variables (X, Y) (Sustainable Supply Chain Management & Environmental performance of retail petrol stations in Saudi Arabia), as the correlation coefficient is (0.697**) according to the correlation of Person, and at a significance level of (1%). It is also noted that there is an assurance related to the validity of the statements that can be used to measure the study variables, therefore the basic variables (X, Y) are really correlated. And, there is a significant statistical impact of applying Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia.

Keywords: Sustainable supply chain management, Environmental performance, Fuel stations.

Chapter One

Introduction

1. Introduction:

The World Environment and Development Organization define sustainable development as "development necessary to meet contemporary people's needs, they cannot destroy the ability of future generations to meet their own needs." This definition is the most widely recognized. A growing number of organizations are including sustainability on their strategic objectives. Businesses frequently follow the triple bottom line approach put forward by Elkington (1998), who suggested balancing social, environmental, and economic challenges from a micro perspective. Businesses have been paying more attention to social responsibility and environmental practices in recent years, as well as timely release of environmental and corporate social responsibility (CSR) reports, as they have become more concerned with the social parties for sustainable development (Wan Nurul Karimah et al., 2016).

Businesses used social practices (like initiatives to enhance working conditions for employees or assist community activities) and environmental programs (like product design and recycling) to achieve sustainable supply chain management (SSCM) (Wang & Dai, 2018). SSCM has become ingrained in both individuals and companies with the idea of sustainable development and increased awareness of environmental protection and social responsibility. Managers must take the public's attitudes on social responsibility and the environment into account. SSCM is a crucial component of dynamic business development's corporate innovation processes, which are essential to the continued existence and growth of corporate (Gosling et al., 2017).

Generally, supply chain companies assume liability for any adverse impacts caused by any link in the network. Core businesses must take greater accountability for the social and environmental performance of their whole supplier chain. As a result, businesses use the SSCM process to control every supply chain participant in addition to themselves, for sustainable management. To prevent and reduce the negative effects of supply chain members' lack of environmental and social responsibility, supply chain core firms should enhance their environmental and social performance through both internal and external SSCM management (Wang & Dai, 2018). So, this

study examines the effect of Sustainable Supply Chain Management for fuel stations in KSA, analyzes their effect on environmental performance.

1.1. Sustainable Supply Chain Management (SSCM):

1.1.1. Definition of Sustainable Supply Chain Management (SSCM):

SSCM is an activity that helps to advance and make the Sustainable Development Goals (SDGs) possible. These objectives tackle global concerns like poverty, inequality, and climate change (Hák et al., 2016). Koberg and Longoni (2019) claim that over the previous 20 years, supply chain management (SCM) has concentrated on businesses' initiatives to increase their sustainability, especially in relation to their supply chain operations.

A company's operational procedures and strategic plans for efficiently integrating social and environmental considerations into supply chain management are collectively referred to as supply chain socialization (SSCM). Ensuring continuous economic success while improving the company's entire social and environmental output as well as that of its suppliers and consumers is the main goal. According to this concept, businesses should take steps to improve their social and environmental results as well as put policies in place to lessen the impact on their suppliers' and customers' operations (Wang & Dai, 2018).

Organizations can benefit from SSCM in a number of ways, according to Panigrahi et al. (2018), including enhanced environmental performance, cost savings, and improved reputation. They came to the conclusion that efficient supply chain management may significantly improve both the bottom line and the environment, and they suggested that companies give sustainability top priority when building their supply chains.

By creating a strong link between the economy and a suitable supply network, SSCM plays a crucial role in the economy. Businesses and governments have come to understand the importance of sustainable supply chains in fostering social advancement, environmental preservation, and economic growth in recent years (Peng, 2023). To support a successful economy that can meet present and future needs while encouraging regeneration, an SSCM must be developed. Adopting sustainable supply chain practices can open up new economic opportunities. These opportunities include developing eco-friendly technologies, creating jobs in the resource-efficient and renewable

energy industries, and expanding the markets for sustainable products and services (Yang & Wang, 2023).

1.1.2. Sustainable Supply Chain Management Benefits:

Supply chain management allows for the optimization of earnings and social welfare at the same time as reducing operating expenses and environmental issues (Kusi-Sarpong et al., 2019). From a triple bottom line (TBL) standpoint, supply chain management (SSCM) is essential for mitigating the negative effects of operations and increasing an organization's efficiency (Vargas et al., 2018). Organizations can attain sustainability through SSCM programs (Danese et al., 2019).

As a result, businesses have been incorporating sustainability into their supply chains more and more to protect their reputation and brand, control risks associated with the chain, like labor disputes and environmental damage, maintain business continuity, and reduce expenses and interruptions (Romano et al., 2021). As a result, supply chain sustainability promotes long-term economic, social, and environmental advantages for both businesses and consumers. Furthermore, the incorporation of methods to stop or lessen environmental degradation—such as harmful gas emissions, water pollution, and soil pollution—is made possible by SSCM processes. The objectives of these endeavors are to enhance financial outcomes, optimize earnings, cultivate a positive image, and acquire a competitive edge (Moktadir et al., 2018).

SSCM guarantees optimal production procedures throughout the duration of a product's life cycle (Mathivathanan et al., 2018). It links environmental concerns with development, causing political and economic change at the local, national, and international levels (Mangla et al., 2017). Producers, sellers, and suppliers must use sustainable practices in order to develop a product that is sustainable for end users (Gonçalves et al., 2024).

In order to mitigate the negative effects, companies striving for sustainability in their supply chains must encourage innovation (Koberg & Longoni, 2019). Organizations can gain a lot from sustainable innovation, such as improved earnings, lower operating costs, and a better social image (Gonçalves et al., 2024). It also results in lower costs, an increase in market share, and gains in income and stock (Kusi-Sarpong et al., 2019).

1.1.3. Sustainable Supply Chain Management Barriers:

Businesses trying to incorporate sustainable ideas often face a plethora of obstacles. A portion of these difficulties are brought about by the lack of reliable institutions that offer companies looking to adopt novel procedures methodical direction. A wide range of resources are necessary for successful innovation, such as financial capability, funding availability, the ability to hire highly skilled teams, market expertise, research and development, and efficient coordination and cooperation among supply chain partners (Gonçalves et al., 2024).

Employees in supply chain firms must be better equipped to traverse these obstacles by having a deeper awareness of their nature and techniques for overcoming them. This enables them to constructively address obstacles and promote reforms that advance sustainability. Consolidating and implementing all of these tactics at once, though, can be a difficult task. For this reason, businesses need to determine what obstacles stand in the way of their objectives, rank them, and devise plans to get through them. Still, integrating SSCM into conventional supply chains is a challenging undertaking every time (Gupta et al., 2020).

Big SSCM efforts frequently encounter difficulties during implementation, whether in a production or service setting, mostly as a result of hurdles receiving insufficient attention. Because they are unaware of significant barriers, 35% of businesses are unable to use SCM (Goçalves et al., 2024). As a result, professionals must not only investigate these obstacles in light of the nature of their company but also weigh the significance of each to establish its relative relevance. Using this method enables companies to pinpoint ways to get beyond current obstacles to supply chain sustainability implementation. These tactics entail detailed action plans meant to assist businesses and their supply chains in overcoming the obstacles associated with achieving sustainability. Nonetheless, there are still few thorough studies that identify obstacles as well as solutions for them (Gupta et al., 2020).

1.1.4. Dimensions of Sustainable Supply Chain Management (SSCM):

- **Economic Sustainability:**

Economic sustainability refers to the impressive use of resources to reduce the negative consequences of resource exploitation and have long-term substantial impact. Economic stability is

characterized by both attainable returns on investment and assurances that the activities of organizations do not result in any kind of social or environmental harm. Businesses that are economically sustainable always ensure that there is enough cash flow to maintain liquidity and consistently generate above-average returns for their shareholders. Because of this, achieving sustainability necessitates that economic record-keeping systems replicate environmental resources (Mac-Kingsley & Pokubo, 2018).

- **Environmental Sustainability:**

One important aspect of sustainability is the environment. It is a compilation of the limitations of the four primary activities that comprise the human economic subsystem's scale: the use of both non-renewable and renewable resources on the source side and waste assimilation pollution on the sink side. Since its establishment, the environment has been more and more destroyed. Sustainability is required because of the way natural resources are wasted. In today's economic environment, an organization's ability to survive depends on how much it integrates environmental factors into its supply chains (Mac-Kingsley & Pokubo, 2018).

- **Social Sustainability:**

Social sustainability addresses a number of issues that at first glance might seem like simple moral or consumer decisions, such as the relationship between corporate power and environmental justice, human rights and development, global poverty and citizen action, and responsible global citizenship. Companies that incorporate social ethnicity, environmental concerns, and operational activities beyond legal requirements are considered socially responsible. Their actions have the potential to improve the quality of life for most company stakeholders (Mac-Kingsley & Pokubo, 2018).

1.2. Environmental Performance:

An organization's dedication to protecting and enhancing the environment is reflected in its environmental performance. Zhu et al. (2017) state that the company may cut back on the amount of air, liquid, and solid waste it produces as well as the amount of hazardous and toxic products it uses and the frequency of environmental mishaps (Dzikriansyah et al., 2023).

Environmental performance is the preservation of the environment and the mitigation of the harm that business operations cause to the environment. In order to minimize or completely eliminate the production of waste and pollutants both during and after the production process, companies are therefore expected to reduce and regulate their use of energy and natural resources. Additionally, companies can introduce new, environmentally friendly products that have a lower ecological trace (Mac-Kingsley & Pokubo, 2018).

EP is described as an organization's pledge to maintain and safeguard its natural environment. A number of factors, including the preservation of soil, water, and air quality, were taken into account when measuring EP (Aggarwal & Agarwala, 2023). Sen et al. (2013) used two methods to categorize the measurement of EP:

- **Direct approach:** This method concentrated on quantifying the variables that directly affect pollution management plans and techniques. These encompass a variety of strategies, including environmental innovation management, planning environmental impact assessment, and intelligent and information-based environmental management.
- **Indirect approach:** These methods lead to improvements in environmental performance but do not directly address pollution control techniques and tactics. It involves a number of strategies, including choosing an environmentally friendly supplier, cutting back on energy use, and emphasizing waste reduction.

1.3. Research Problem:

The oil industry is huge and important in today's world. In addition to being a significant source of energy, petroleum products and their byproducts are used as feedstock for a variety of consumer goods in the petrochemical, textile, pharmaceutical, and fertilizer industries. If not managed properly, the greater oil business might lead to major environmental dangers and have a detrimental effect on the land, water, and air in addition to all living things. The retail fuel service station industry and business rely on the environment for functionality, resources, and ultimately trash disposal. As a result, they play a crucial part in assisting global efforts to achieve sustainable development (Kany, 2014).

A factory that sells fuel and lubricants for cars is known as a retail fuel station. Gasoline, liquefied natural gas (LNG), diesel, kerosene, and motor oil are all sold at retail gasoline stations. Effective

oil supply is essential to the operation of modern society. Consequently, as a result of urbanization, retail gas stations are present in many nations. As a result, the constant vapor emissions have a negative impact on the health of the local population. Products, particularly gasoline, that are sold at retail fuel stations contain volatile organic compounds like benzene, which can catch fire and release vapour even at low temperatures. According to certain empirical research, breathing in benzene when exposed to the environment can result in lung cancer, leukemia in the brain and stomach, irritation of mucous membranes, dermatitis, bone marrow depletion, and heart attacks (Mac-Kingsley & Pokubo, 2018).

The supply chain for gas and oil includes the retail gasoline stations. There are three sectors in the oil and gas supply chain: upstream, midstream, and downstream (Briggs et al., 2012). Selling goods that release emissions during usage or storage is under the purview of the downstream industry. According to Lenzen and Murray (2010), the downstream industry is brought to life and sustained by sales, which come with emissions that would have been revealed in a different way. Thus, incidents of environmental deterioration that are typical of product delivery and dispensing do not exclude the retail fuel station. Sustainable supply chain management will therefore be essential to the sector. On the other hand, little is known about the industry's sustainable supply chain management strategies and how they improve environmental performance. Suspicion that the retail gas stations lack well-established sustainable supply chain management techniques that produce favorable environmental performance could not be entirely out of place.

Thus, how does sustainable supply chain management affect the environmental performance of retail petrol stations in Saudi Arabia is the current study's main issue. This is what the study's issue is. The issue at hand is understandable given the impact it currently has and will continue to have on retail fuel stations, society at large, and other relevant parties if it is not resolved.

1.4. Research Importance:

- Assisting supply chain managers in responding to the growing trends towards sustainability issues and attention to environmental and societal issues, especially in Arab countries.
- Helping business organizations develop competitive advantages resulting from improved financial performance as a result of adopting and applying sustainable supply chain practices.

- Helping business organizations carry out their social and environmental responsibilities and improving their image in society in general.
- Following up on recent studies in the field of supply chain management, which tended to study the transformation from traditional supply chain practices to adopting modern practices that take into account the current environmental and societal dimensions.
- The research is an extension of the growing trend of research in the field of supply chain management by linking supply chain practices and activities, sustainability practices, environmental conservation issues, and scarce resources from a holistic perspective.

1.5. Research Questions:

- What is the impact of economic sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia?
- What is the impact of Environmental sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia?
- What is the impact of Social sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia?

1.6. Research Objectives:

- Determine the impact of economic sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.
- Determine the impact of Environmental sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.
- Determine the impact of Social sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.

1.7. Research Hypothesis:

H1: There is a significant positive effect of Economic sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.

H2: There is a significant positive effect of Environmental sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.

H3: There is a significant positive effect of Social sustainability on the environmental performance of Fuel stations in the Kingdom of Saudi Arabia.

1.8. Research Model:

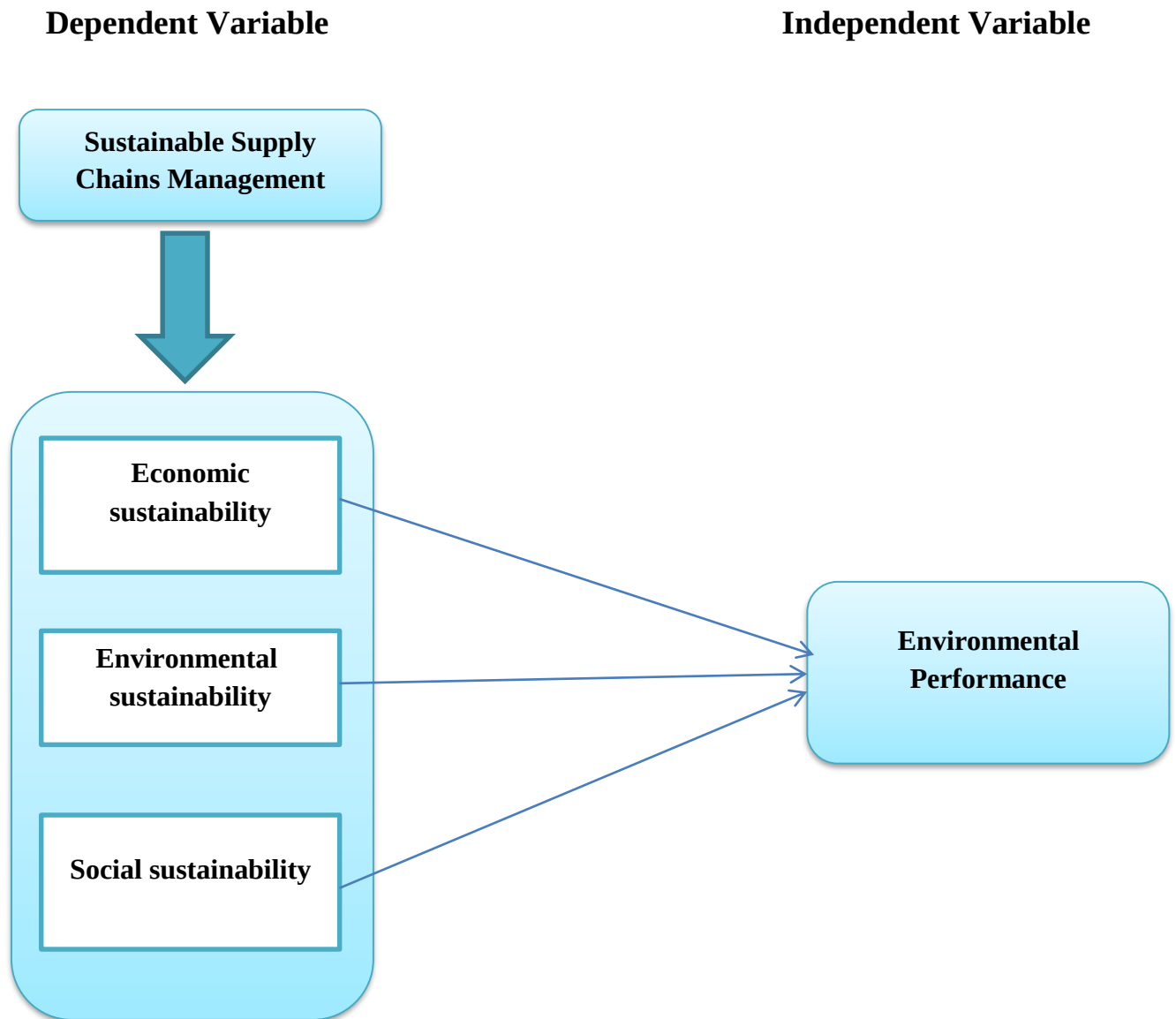


Figure 1: Research Model.

1.9. Research Methodology:

The study's perspective is based on retail fuel stations in the Kingdom of Saudi Arabia that have adopted sustainable supply chain management. A total of 200 managers at retail gas stations in Saudi Arabia will give questionnaire surveys to complete. The managers were categorized by job title and job responsibilities as purchasing, distribution/logistics, SCM, transportation, material, and operations.

On a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), the respondents were asked to rate the degree to which environmentally friendly supply chain management techniques correlate with environmental performance. The reliability of each scale was assessed using the Cronbach's alpha. When an alpha value is greater than 0.7, all scales are regarded as credible.

1.10. Timeline Table:

Assignment	Weeks											
	1	2	3	4	5	6	7	8	9	10	11	12
#1												
#2												
#3												
#4												

Chapter Two

Literature Review

2. Literature Review:

In this part, the researcher will discuss previous studies that dealt with the study variables of sustainable supply chain and environmental performance, and they will be presented from oldest to newest, where the relationship between both the independent variable and the dependent variable will be clarified as follows:

2.1. (Esfahbodi et al., 2016): "Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance".

This study links SSCM practices and organizational performance by developing and empirically evaluating an integrated SSCM performance framework supported by the Resource Dependence Theory (RDT). This study applies the RDT tenets to comprehend how businesses leverage the resources of their partners to adopt SSCM practices and handle the performance consequences. through an empirical investigation of 128 manufacturing companies—72 in China and 56 in Iran—this study analyzed and evaluated how the implementation of SSCM affected cost and environmental performance in these two developing economies. The results of a multiple regression analysis indicate that these two growing economies have more things in common than things in different ways. The findings show that while adopting SSCM procedures raises environmental performance standards for Chinese and Iranian businesses, it does not always translate into better cost performance. Our findings imply that in order to minimize trade-offs between cost performance and environmental sustainability, businesses operating in emerging countries should approach SSCM programs with a more comprehensive focus on their financial bottom line.

2.2. (Costantini et al., 2017): "Eco-innovation, sustainable supply chains and environmental performance in European industries".

Green technology adoption and introduction are seen to be the most economical ways to lessen environmental impact without sacrificing economic competitiveness. Although the scientific literature has highlighted the critical role that green technology diffusion channels play throughout the supplier value chain, there are few actual quantitative studies regarding the efficacy of green

technologies in enhancing environmental performance. This paper's goal is to draw attention to how inter-sectoral relationships shape how eco-innovations affect sectoral environmental performance. Empirical research demonstrates that Eco innovations have both direct and indirect benefits on reducing environmental stress, and that the degree of these effects changes along the value chain based on the technology used and the kind of pollutant being studied. First, corporate and policy governance strategies should explicitly address the objective of maximizing environmental gains that can be achieved through the development and adoption of clean technologies along the supply chain. Secondly, both strategies should be coordinated in order to minimize the costs for reducing environmental pressures. These are the main conclusions that can be drawn from this.

2.3. (Wang & Dai, 2018): "Sustainable supply chain management practices and performance".

This research aims to provide a substantial empirical contribution to the field's understanding of how Chinese enterprises' performance is affected by sustainable supply chain management (SSCM) methods. A thorough SSCM practices and performance model are also intended to be theorized and empirically evaluated in this study. The model analyzes the effects on corporate sustainability performance from all angles, taking into account the two SSCM practice components of internal and external management. This study creates a conceptual model to look into how SCM practices affect the performance of the company. This article uses PLS structural equation methods to assess the effects of SSCM practices on firm economic performance, environmental performance, and social performance for each dimension based on data from 172 Chinese enterprises. The findings demonstrate that a company's internal SSCM procedures improve both its social and environmental performance. Furthermore, there exists a positive correlation between economic performance and environmental and social performance.

2.4. (Wang et al., 2018): "Moderating the Role of Firm Size in Sustainable Performance Improvement through Sustainable Supply Chain Management".

The study of sustainable supply chain management (SSCM) for businesses has significant practical value in light of the Chinese government's policy for sustainable development. Using hierarchical regression analysis using SPSS 22.0, the model examined the moderating effect of firm size on the SSCM practices and the sustainable performance of the firms (economic, environmental, and

social), drawing data from 172 Chinese enterprises. The findings imply that the environmental and social performance of the company is positively correlated with the use of SSCM techniques and business size. The impact of SSCM techniques on economic performance is mitigated by firm size. Furthermore, major businesses' financial performance is significantly improved by SSCM internal processes; small and medium-sized businesses' (SMEs) financial performance is not as greatly affected. Firm size is identified as a moderating factor in the entire SSCM practice performance model that is proposed in this paper. SSCM is implemented and recommended for varying firm sizes based on studies on the moderating influence of firm size.

2.5. (Acquayea et al., 2018): "A quantitative model for environmentally sustainable supply chain performance measurement".

The current work proposes a comprehensive environmental sustainable performance measurement model supported by industrial lifecycle thinking, by utilizing the power of a Multi-Regional Input–Output framework to handle the intricate and global nature of supply chains. In an effort to address some of the methodological and applied measurement issues, some theoretical insights are thus offered and an empirical application of the model to the Metal Products industry of the BRICS (Brazil, Russia, India, China, and South Africa) nations is undertaken. This, in particular, made it possible to simulate the patterns in carbon emissions over a 20-year period (1992–2011) both within and between the BRICS countries and with the rest of the world, and it also gave rise to speculation on how well these countries will perform in terms of carbon emissions in the future. Analyses conducted specifically on the Metal Product industry revealed that the primary cause of the rising carbon footprint is demand. Nonetheless, technologically-driven efficiency gains and reductions in emissions intensity were the main causes of the overall drop in reported carbon footprint. The report also evaluates how imports and economic expansion affect carbon footprint and talks about how the findings may affect the BRICS countries' sustainable transition procedures.

2.6. (Somjai et al., 2019): "The Trade-off between Cost and Environmental Performance in the Presence of Sustainable Supply Chain".

Examining the trade-off between cost performance and environmental performance in the context of a sustainable supply chain is the primary goal of the current study. The study has specifically looked at the effects on costs and environmental performance of implementing sustainable supply

chain practices, such as sustainable manufacturing, distribution, procurement, and reserve logistics. The question of whether or not SSCM operations may improve a firm's profitability and financial performance has been raised in the study. In the context of developing economies, research is scarce. On the other hand, a wealth of research on industrialized economies exists. Understanding how SSCM programs affect the sustainability of manufacturing in developing nations is important. It is imperative to comprehend the correlation between SSCM projects and performance in growing regions, such as Indonesia. The theoretical underpinning and hypothesis of the current investigation have been supported by the study's findings. Policymakers and practitioners will find the current study useful in understanding the problems associated with supply chain performance and the implementation of sustainable supply chains. As far as the author is aware, this is one of the very few groundbreaking works on the subject.

2.7. (Andalib Ardakani & Soltanmohammadi, 2019): "Investigating and analyzing the factors affecting the development of sustainable supply chain model in the industrial sectors".

Supply chains are under more pressure to be sustainable as a result of the rising demands for goods, which have a detrimental impact on the environment and society by exacerbating environmental and social disasters. Owing to the importance of sustainability, this study proposed a conceptual model based on six hypotheses in an effort to explore the factors that motivate sustainable supply chain management. 91 industry experts answered an 18-item questionnaire, and partial least squares path modeling was used to analyze the data. Path modeling results showed that green supply chain management and environmental performance management can effectively address social issues through green product creation. Furthermore, it was discovered that the green supply chain management has a direct impact on environmental performance management. As a result, several conclusions about the value of sustainable supply chain management and manager practices were made.

2.8. (Baliga et al., 2019): "Sustainable supply chain management practices and performance".

The goal of this research is to create an integrated study that makes use of the antecedent-activities-performance principles to identify the factors that motivate supply chain management (SSCM) practices and the effects these practices have on the performance of sustainable supply chains. The

study is important because the Indian government is working hard to grow the manufacturing sector, and one of the key requirements for Indian manufacturing to remain competitive internationally is sustainability. A comprehensive literature analysis informed the development of the survey instrument, which was used to poll 211 functional heads and managers of operations and supply chains in the Indian manufacturing sector. Confirmatory factor analysis was used to validate the scales, and then Amos 20.0 structural equation modeling was used to establish the structural relationships between the components. With the exception of the relationship between LM and social practices in the SCM, the results of the SEM indicate that the antecedents, or motivators, LM and SM, have a significant impact on environmental and social practices in the SCM. These practices also have a positive relationship with SSCM performance, with acceptable goodness-of-fit measures. Therefore, it may be claimed that seven of the eight hypotheses are statistically significant.

2.9. (Ni & Sun, 2019): "The effect of sustainable supply chain management on business performance: Implications for integrating the entire supply chain in the Chinese manufacturing sector".

An integrative method for examining supply chain management's (SSCM) impact on company performance is presented in this study. The concept of SSCM was put forth in three dimensions: outbound, internal, and inbound sustainability. Partial least squares structural equation modeling was used to test the conceptual model within the framework of China's manufacturing industry. The findings demonstrated that whilst internal and inbound sustainability had an indirect impact on business performance, outbound sustainability had a direct relationship with it. Additionally, the model showed that the relationship between internal and outbound sustainability was strengthened by customer integration. The findings indicated that while examining the relationship between SCCM and business success, the supply-side and demand-side sustainability had distinct roles and that the complete supply chain should be integrated. The realization of demand-side value creation was the only way to attain company performance, since a supply-side collaboration advantage was important but insufficient. The results highlight the unique functions of each SSCM dimension and the significance of supply chain integration.

2.10. (Tran et al., 2020): "The impact of supply chain quality integration on green supply chain management and environmental performance in Vietnam's tourism industries".

This research aims to evaluate the effects of supply chain quality integration on financial performance, environmental performance, and green supply chain management. An analysis was conducted on 568 tourism-related enterprises in Vietnam. Software such as SPSS 22 and Smart PLS 3.6 were used to analyze the results. The findings demonstrate that financial performance and green supply chain management were positively impacted by supply chain quality integration. Financial and environmental performance both benefited from green supply chain management. In the relationship between supply chain quality integration and financial performance, green supply chain management also fully mediated. However, there was no moderating effect of scale or institutional pressure on the relationship between financial and environmental performance and green supply chain management.

2.11. (Taghipour & Beneteau-Piet, 2020): "Sustainable Supply Chain Management Performance".

More than ever, sustainable supply chain management is a crucial topic to discuss. Businesses must incorporate environmental concerns, such as global warming, into their management for a number of crucial reasons, including maintaining a positive brand image, cutting operating expenses, and complying with legal requirements. In this review, we'll examine how the literature has emphasized the idea of sustainable supply chain management (SSCM) and what approaches have been suggested to support businesses in addressing issues related to sustainable development. It will become apparent that three crucial elements must be taken into account. The literature refers to them as "the triple bottom line approach" and they include social, environmental, and economic factors. This process will be examined in order to gauge how well a business employing SSCM as a management approach performs.

2.12. (Narimissa et al., 2020): "Evaluation of sustainable supply chain management performance: Dimensions and aspects".

Over the last ten years, businesses have realized that in order to make their supply chains more competitive, they need to use effective methods. As a result, a sustainable supply chain perspective has evolved from the old supply chain viewpoint. Improved performance is an advantage for organizations that prioritize sustainability. Sustainability deployment is required to identify the

aspects and second layer of sustainability in addition to the primary sustainability dimensions, such as the social, environmental, and economic dimensions, in order to categorize the supply chain indicators. Research has demonstrated that the distinction between the dimensions and elements of sustainability is not given due consideration in the crucial paradigm of sustainability. Consequently, taking into account the function and impact of sustainability's dimensions and features is crucial for facilitating the implementation and evaluation of sustainability. Two primary and useful goals guide the conduct of this paper. First, the literature's lack of conflicts has been highlighted by examining and identifying the dimensions and elements of sustainability. Second, based on the opinions of experts, the most crucial sustainability dimensions and elements are determined in one of Iran's oil businesses' supply chains. The findings of this study will help the researchers take sustainability into account and enhance the relevant industry policies.

2.13. (Isnaini et al., 2020): "Moderating Effect of Supply Chain Dynamic Capabilities on the Relationship of Sustainable Supply Chain Management Practices and Organizational Sustainable Performance: A Study on the Restaurant Industry in Indonesia".

In the current study, the relationship between SSCM practices and organizational sustainable performance (OSP) indicators—that is, "economic performance, environmental performance, social performance"—in the Indonesian restaurant industry is examined, with an emphasis on the empirical moderating effect of supply chain dynamic capabilities (SCDC). A 78% response rate was obtained by employing the basic random sample technique to gather data from the 210 supply chain managers for this purpose. The results of this study also demonstrated that SCDC considerably modifies the relationship between OSP and SSCM practices in Indonesia's restaurant business. This demonstrates that SCDC is regarded as the study's major contribution. Furthermore, adding to the body of knowledge are the theoretical and practical consequences of the current research. At the end of the study, the limitations and future directions are also highlighted.

2.14. (Kuwornu et al., 2023): "The adoption of sustainable supply chain management practices on performance and quality assurance of food companies".

This study looked at how food companies in Bangkok, Thailand, were able to ensure food quality and perform sustainably when they adopted sustainable supply chain management (SSCM) strategies. 126 food enterprises in Bangkok were given questionnaires to complete in order to gather primary data. To investigate the impact of both external and internal sustainable supply

chain management techniques on sustainable performances, the Seemingly Unrelated Regression (SUR) method was employed. To investigate the impact of sustainable performances on the food company's quality assurance, Ordinary Least Squares (OLS) was utilized. The empirical outcome of the study showed that the financial, environmental, and social performances of the organizations are positively impacted by both internal and external SSCM strategies. Quality assurance is positively impacted by the sustainable performance metrics, which include environmental, financial, and social aspects. This report offers suggestions for Thai food companies looking to implement SSCM processes.

2.15. (Bentalha, 2024): "Sustainable Supply Chain Management in Tourism: An Understanding of the Prospective Possibilities of Environmental Performance".

Ensuring long-term social, economic, and environmental stability is the goal of sustainable logistics management, which promotes long-term sustainable growth. The use of sustainable logistics techniques in the management of logistics associated to tourism is being driven by the worldwide push towards sustainable development, with an emphasis on achieving environmental performance targets. As a result, the subject of tourism logistics operations is receiving more and more theoretical and practical attention. This chapter looks at how service organizations' environmental performance is affected by sustainable tourism supply chain management. The authors examine the connection between environmentally friendly logistical methods in tourism and their impact on environmental performance using a prospective approach. The results show that the responsible supply chain in the tourism sector may function more efficiently when logistics resources are integrated, cooperative, and shared.

Chapter Three

Research Methodology

3. Research Methodology:

The study methodology and procedures are considered a major axis through which the applied side of the study is accomplished, and through it the data required to conduct the statistical analysis are obtained in order to reach the results that are interpreted in the light of the study literature related to the subject of the study in order to achieve the objectives of the study, so this part aims to explain the methodology of the study and its procedures. This part will deal with an explanation of the method of the study used, a description of the study population, as well as the study tool used, the method of its preparation, how it was built and developed, and the extent of its validity and stability.

According to the objectives of the study, the researcher will use the analytical descriptive approach, which relies on studying the phenomenon as it exists in reality and is interested in describing it as an accurate description and expressing it qualitatively and quantitatively.

3.1. Data collection methods:

The study relied on two types of data sources:

- **Secondary data sources:** In addressing the theoretical framework of the research, the two researchers turned to secondary data sources, which include relevant Arabic and foreign books and references, periodicals, articles, reports, and previous research and studies that dealt with the subject of the research.
- **Primary data sources:** Because the researchers believe that the secondary data sources are not able to fully cover the research, they will resort to using the primary sources of data by using the questionnaire as a main tool for the study in data collection and case study.

3.2. Population: The study population consisted of all Fuel Stations in KSA for the year 2020-2021. To get reliable information, the researcher distributed several questionnaires lists on the participants at on Fuel Stations in KSA.

3.3. Sample: Due to the difficulty of a comprehensive inventory of the study population, the researcher relied on drawing an arbitration sample of 33 observations, so the response rate can be illustrated in table (1):

Table (1) Distribution of the study sample according to the Job title at work

the Job title at work	Frequency	Percent
Manager	28	84.8
Owners	5	15.2
Total	33	100.0

(Source: researcher's calculation).

The table (1) illustrates that a big number of the respondents are managers, as they represent (84.8%), followed by 15.2 % of respondents are owners.

3.4. Study variables:

The study involves several independent variables (X) and dependent (Y) variables, as X totaled (14) factors & Y totaled (5) factors. Table (2) shows the various study variables simply:

Table (2) Independent (X) and Dependent (Y) Variables Related to the Study

Variable	Coding
Sustainable Supply Chain Management	X
Economic Sustainability	X1
Fuel Station's material procurement costs have decreased	X11
Fuel Station's energy consumption costs have decreased	X12
Fuel Station's waste management charges have decreased	X13
Fuel Station has reduced the charges paid for the disposal of wastes	X14
Environmental Sustainability	X2
Fuel Station reduced the amount of wastewater	X21
Fuel Station reduced the amount of solid waste	X22
Fuel Station reduced the number of environmental accidents	X23
Fuel Station improved its environmental management system and practices	X24
Social Sustainability	X3
Fuel Station implements occupational health and safety, work standards compliance, and audit systems for our supply chain partners	X31
Fuel Station develops systems of professional ethics with our supply chain partners	X32

Variable	Coding
Fuel Station and supply chain partners have reduced the health risk that consumers may encounter	X33
Fuel Station has benefited employees throughout the supply chain	X34
Fuel Station and supply chain partners have reduced occupational safety and health risks in new products/processes developed over the last two years	X35
Fuel Station carries out supply chain strategy changes that minimize adverse impacts	X36
Environmental performance of retail petrol stations in Saudi Arabia	Y
Fuel Station has reduced consumption of hazardous/toxic material	Y1
Fuel Station has reduced air emissions	Y2
Fuel Station has reduced effluent wastes	Y3
Fuel Station has sought to improve its environmental image/position	Y4
Fuel Station has reduced energy consumption	Y5

(Source: Prepared by the researcher).

3.5. Study tool: The time series methodology consists of sequential stages, starting with the stage of diagnosis and description of the model, which is the most important stage, followed by the stage of estimating the parameters of the model, then the stage of examining the suitability of the model, and the final stage comes, which is the forecasting stage. This estimation goes through the following steps:

- Conducting a unit root test for time series to determine their stability and determine their degree of integration.
- Testing the equilibrium relationship between variables in the long run by following the cointegration test using the autoregressive approach for lag periods.

Time series analysis is one of the important mathematical and statistical methods that deals with the behaviour of phenomena and their interpretation over extended periods of time. The objectives of time series analysis can be determined by obtaining an accurate description of the special features of the process from which the time series is generated and building a model to interpret its behaviour and using the results to predict its behaviour in the future, as well as Control

the process by which the time series is generated by examining what happens when some model parameters change.

A time series is defined statistically as a series of random variables defined within a multivariate probability space and indexed by the index t , which refers to an index set T . The time series is usually symbolized by the abbreviation $(Y(t))$ and consists of two variables, one is explanatory, which is time, and the other is the response variable, which is the value of the phenomenon studied.

3.6. Data Collection:

3.6.1. The Stage of Preparing the Questionnaire List:

To achieve the study objectives, the researcher depended on the following sources:

- The questionnaire list is considered as a basic tool for collecting the needed data about the impact of Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia. **The survey list was divided into 2 major sections:**
 - a. Consists of general data that is the job, the scientific and professional degree, the years of experience in addition to the training courses.
 - b. Consists of some questions according to the Five-Point Likert scale that provided a great amount of freedom of the sample when answering the survey list questions, and to make the results more accurate, as the reliance on the Likert scale can convert the descriptive statements into quantitative statements to be treated statistically in a simple way. The Five-Point Likert scale helps design the questionnaire list on five weights, thus Likert scale ranges from: 1. Strongly Agree, 2. Agree, 3. Somewhat Agree 4. Disagree, 5. Absolutely Disagree

3.6.2. The Stage of Distributing and Collecting the Questionnaire List:

The lists were distributed to the study sample to answer at a specific time, and then the data were collected and statistically analyzed after testing its statistical viability to a normal distribution of the data.

3.7. Statistical Methods Used in Data Analysis:

- **Descriptive Analysis** which can be used to determine the attributes of the study samples through recognizing the mean averages and standard deviation.
- **Cronbach's Alpha Test** can be used to determine the validity and reliability of the questions in the questionnaire.
- **One-Sample Kolmogorov-Smirnov Test** which tests the normal distribution of the study data to determine the suitable statistical tests to analyze the desired data.
- **Kruskal-Wallis Test** which determines the main differences between the trends of the study sample around the role of Sustainable Supply Chain Management to maximize the Environmental performance of retail petrol stations in Saudi Arabia according to demographic characteristics.
- **Correlation Analysis (Pearson)** which estimates the strength and direction of the relationship between the Sustainable Supply Chain Management and the Environmental performance of retail petrol stations in Saudi Arabia. The correlation analysis and determination of the relative contribution can eliminate the personal bias effect in answers to the questions.
- **Multiple Regression Analysis** which can be used to identify the most important predictive variables of adopting Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia, as the independent variables appears in the model to illustrate its role in Environmental performance of retail petrol stations in Saudi Arabia.

3.8. Unit Roots Test:

The stability of time series is an important topic; As inference with unstable variables gives misleading results, as the relationship between unstable variables is not real and this is called false regression, and there are many statistical methods used to test stability, and one of the most accurate and widespread methods is the unit roots test, and the goal of testing a root The unit examines the properties of the time series for each variable over the time period of the observations, ensures its stability, and determines the degree of integration of each variable separately. If the series is stable after taking the first difference, then the original series is integrated of order 1, i.e. $I(1)$, but if the series is stable after taking the second difference, then the first series

is integrated of second order, i.e. $I(2)$. Thus, if the original series is stable in its original values, it is said to be integral of order zero; Therefore, it does not have the unit root, i.e. $I(0)$. In general, the series X_t is integral of degree (d) if it stabilizes after taking the difference (d) .

To test the stability of time series, several tests are used, the most important of which are:

* Augmented Dickey-Fuller Test (ADF) The basis of the DF test (1979) assumes that the time series is generated by an autoregressive (AR) process.

Chapter Four

Data Analysis

4. Data Analysis:

This section describes the extent of validity and reliability of questions, it includes the statistical methods adopted by the researcher for testing and analyzing the data, it clarifies the main features, using the methods of the most accepted descriptive analysis such as Mean, Rank and the standard deviation. This section discusses the following elements:

- (4.1) Analyzing the characteristics of the study sample.
- (4.2) Testing the validity and reliability of the questionnaire list.
- (4.3) Analyzing the normal distribution of the data.
- (4.4) Descriptive analysis of the study variables.
- (4.5) Testing the study hypotheses and analyzing the results.

4.1. Analysis of the characteristics of the study sample:

The characteristics of the study sample can help to obtain more accurate data and play an important role in explaining the study results, so that we can rely on them. A set of characteristics such as (scientific qualifications, work experience, training courses) have an important value in determining the extent of understanding the questions by the study sample.

4.1.1. Distribution of the study sample according to respondent gender:

Table (3) Distribution of the study sample according to the gender

Gender	Frequency	Percent
Male	29	87.9
Female	4	12.1
Total	33	100.0

(Source: researcher's calculation).

The table (3) illustrates that a big number of the respondents are male, as they represent (87.9%), followed by 12.1 % of respondents are female.

4.1.2. Distribution of the study sample according to Length of Work in the Company:

Table (4) Distribution of the study sample according to Length of Work in the Company

Length of Work in the Company	Frequency	Percent
Between 2-5 years	15	45.5
Between 5-8 years	6	18.2
Between 8-10 years	4	12.1
More than 10 years	8	24.2
Total	33	100.0

(Source: researcher's calculation).

The table (4) shows that the high level of **Length of Work in the Company**, as (45.5%) of the respondents Between 2-5 years of experience in company, followed by (24.2%) of the respondents More than 10 years of experience in company.

4.1.3. Distribution of the study sample according to Number of Workers Fuel Station:

Table (5) Distribution of the study sample according to Number of Workers Fuel Station

Number of Workers Fuel Station	Frequency	Percent
From 20 to 60 <i>Employees</i>	27	81.8
<i>Over 100 Employees</i>	6	18.2
Total	33	100.0

(Source: researcher's calculation).

The table (5) declares the high level of Number of Workers Fuel Station, as (81.8%) of stations have from 20 to 60 Employees and 18.2 of stations have Over 100 Employees.

Through the previous presentation it is possible to confirm the possibility of relying on the results obtained as they are based on a high balance of experience and education.

4.2. Testing the validity and reliability of the questionnaire list:

This test aims to assess the degree of stability and reliability of each axis in addition to its items, so the researcher can rely on the results of statistical analysis of the questionnaire and generalize them on the study population. To determine the efficiency of the questionnaire list, the researcher can use the test of Cronbach's Alpha which measures the reliability and stability of the survey. According to statistical standards, the value is accepted in case of the desired limits (equal

or greater than 60% to apply the results to the study population (Sekaran & Bougie, 2016). The following items can be considered.

4.2.1. Reliability of Measurements in the Study:

It means that the same results of the measurements will be given in case of redistributing them in any time and under the same conditions. To test the reliability and stability of the questionnaire, Cronbach's Alpha test is used.

4.2.2. Validity of the Items in the Study:

The validity of any measurements was confirmed through the reliability coefficient, as it was one of the main statistical methods. The validity coefficient is equal the square root of alpha Cronbach coefficient; it must be in the needed limit (equal or more than 60%).

According to the previous information, table (6) will declare the analysis of reliability and validity of the basic variables in the survey.

Table (6) The reliability & validity of the basic variables in the survey

Basic Axes of the Questionnaire	Coding	Number of statements	Reliability coefficient	Validity coefficient
Economic Sustainability	X1	4	0.663	0.814
Environmental Sustainability	X2	4	0.756	0.869
Social Sustainability	X3	6	0.755	0.868
Sustainable Supply Chain Management		14	0.879	0.937
Environmental performance of retail petrol stations in Saudi Arabia		5	0.876	0.936
Total Items of (X & Y)		19	0.932	0.965

(Source: researcher's calculation).

- Table (6) illustrates that the value of validity coefficient at the survey level in general is (96.5%), which is statistically good. The validity coefficient values for all the

questions and axes of the survey list are (0.814, 0.869, 0.868, 0.835, 0.754, 0.875, 0.897, 0.8, 0.896) also statistically good. The validity coefficient is 60% or more.

- Table (6) also shows that the value of the reliability coefficient at the survey level in general is (93.2%), which is statistically good. The reliability coefficient values for all the questions and statements of the survey list are (0.663, 0.756, 0.755, 0.698, 0.569, 0.766, 0.805, 0.640, 0.804) also statistically good. The reliability coefficient is 60% or more. Therefore, the survey list has a high degree of internal consistency and reliability, and the researcher can rely on them to achieve the objectives of the study and popularize the results.

4.3. Analyze the normal distribution of the data:

The researcher depends on the test of One-Sample Kolmogorov Smirnov to determine whether the study data follows the normal distribution or not, then the researcher can choose the appropriate statistical tests to analyze the study data. Table (7) shows the results of One Sample Kolmogorov Smirnov test:

Table (7) The results of (Kolmogorov-Smirnov) test for the normal distribution of the data

Coding	Questionnaire Axes	Test Statistic	P-value
X1	Economic Sustainability.	0.155	.000
X2	Environmental Sustainability.	0.219	.000
X3	Social Sustainability.	0.118	.000
X	Sustainable Supply Chain Management	0.186	.000
Y	Environmental performance of retail petrol stations in Saudi Arabia	0.165	.000

(Source: researcher's calculation).

Table (7) illustrates that P-value (significant) for test statistic in Kolmogorov test is less than (0.05), so the data does not follow the normal distribution. On the other hand, the researcher will rely on nonparametric tests to prove the hypotheses validity and achieve more accurate results.

4.4.Descriptive analysis of the study variables:

This sub-section will show the results of descriptive statistical analysis that related to the impact of Sustainable Supply Chain Management environment on Environmental performance of retail petrol stations in Saudi Arabia. The descriptive statistical analysis that includes (mean & standard deviation) will be applied in determining the trends of the sample; to identify the most important statements as well as the least important one.

Table (8) Relative importance of standard means of the survey items

Standard Average	Proportional Importance
From 1 to 1.79	Very Little
From 1.8 to 2.59	Little
From 2.6 to 3.39	Average
From 3.4 to 4.19	High
From 4.2 to 5	Very High

Source: (Matell & Jacob, 1971).

The previous table (8) shows the relative importance of the questionnaire items is determined according to the scale and numbers in this table.

4.4.1. The descriptive analysis of the sample responses for the independent variables (X) will be as follows:

4.4.1.1 Descriptive analysis of Economic Sustainability:

Table (9) The descriptive analysis of Economic Sustainability

Statement		Mean	Standard Deviation	Rank
X11	Fuel Station's material procurement costs have decreased	4.68	0.708	1
X12	Fuel Station's energy consumption costs have decreased	3.83	1.013	3
X13	Fuel Station's waste management charges have decreased	3.71	1.374	4
X14	Fuel Station has reduced the charges paid for the disposal of wastes	4.06	1.197	2

Statement		Mean	Standard Deviation	Rank
X1	Economic Sustainability	4.06	0.529	

(Source: researcher's calculation).

- Table (9) declares that the trends of the sample of the study showed a general agreement towards approving the expressions related to the first independent variable (Economic Sustainability) with a Mean (4.06) and standard deviation (.529).
- The most general agreement in the views of the sample is that the highest dimension to achieve this variable is (Fuel Station's material procurement costs have decreased) with a Mean (4.68) and standard deviation (0.708).
- The lowest dimension for this variable is (Fuel Station's waste management charges have decreased) with a mean (3.71) and standard deviation (1.374).

4.4.1.2. The descriptive analysis of Environmental Sustainability:

Table (10) The descriptive analysis of Environmental Sustainability

Statement		Mean	Standard Deviation	Rank
X21	Fuel Station reduced the amount of wastewater	4.48	0.619	1
X22	Fuel Station reduced the amount of solid waste	4.20	0.930	3
X23	Fuel Station reduced the number of environmental accidents	3.99	1.214	4
X24	Fuel Station improved its environmental management system and practices	4.21	1.012	2
X2	Environmental Sustainability	4.14	0.630	

(Source: researcher's calculation).

- Table (10) illustrates that the trends of the sample of the study showed a general agreement towards approving the expressions related to the second independent variable (Environmental Sustainability) with a Mean (4.14) and standard deviation (.630).
- The most general agreement in the views of the sample is that the highest dimension to achieve this variable is (**Fuel Station reduced the amount of wastewater**) with a Mean (4.48) and standard deviation (.619).

- The lowest dimension for this variable is (**Fuel Station reduced the number of environmental accidents**) with a Mean (3.99) and standard deviation (1.214).

4.4.1.3. The descriptive analysis of Social Sustainability:

Table (11) The descriptive analysis of Social Sustainability

Statement		Mean	Standard Deviation	Rank
X31	Fuel Station implements occupational health and safety, work standards compliance, and audit systems for our supply chain partners	4.64	0.625	1
X32	Fuel Station develops systems of professional ethics with our supply chain partners	4.05	0.904	4
X33	Fuel Station and supply chain partners have reduced the health risk that consumers may encounter	3.97	1.073	5
X34	Fuel Station has benefited employees throughout the supply chain	3.90	1.195	6
X35	Fuel Station and supply chain partners have reduced occupational safety and health risks in new products/processes developed over the last two years	4.27	0.759	2
X36	Fuel Station carries out supply chain strategy changes that minimize adverse impacts	4.13	1.103	3
X3	Social Sustainability	4.21	0.491	

(Source: researcher's calculation).

- Table (11) shows that the trends of the sample of the study showed a general agreement towards approving the expressions related to the third independent variable (Social Sustainability) with a mean (4.21) and standard deviation (.491).
- The most general agreement in the views of the sample that the highest dimension to achieve this variable is (Fuel Station implements occupational health and safety, work standards compliance, and audit systems for our supply chain partners) with a Mean (4.64) and standard deviation (.625).
- The lowest dimension for this variable is (Fuel Station has benefited employees throughout the supply chain) with a Mean (3.90) and standard deviation (1.195).

4.4.2. The descriptive analysis of the sample responses for the dependent variables (Y) will be as follows:

Table (12) The descriptive analysis of the impact of Sustainable Supply Chain Management on the Environmental performance of retail petrol stations in Saudi Arabia

Statement		Mean	Standard Deviation	Rank
Y11	Fuel Station has reduced consumption of hazardous/toxic material	4.04	1.082	4
Y12	Fuel Station has reduced air emissions	4.39	0.651	1
Y13	Fuel Station has reduced effluent wastes	4.06	1.199	3
Y14	Fuel Station has sought to improve its environmental image/position	3.79	1.359	5
	Fuel Station has reduced energy consumption	4.09	0.999	2
Y1	Environmental performance of retail petrol stations in Saudi Arabia	4.07	0.877	

(Source: researcher's calculation).

- Table (12) declares that the trends of the sample of the study showed a general agreement towards approving the expressions related to the dependent variable (Environmental performance of retail petrol stations in Saudi Arabia) with a mean (4.07) and standard deviation (.877).
- The most general agreement in the views of the sample is that the highest dimension to achieve this variable is (Fuel Station has reduced air emissions) with a Mean (4.39) and standard deviation (0.651).
- The lowest dimension for this variable is (Fuel Station has sought to improve its environmental image/position) with a Mean (3.79) and standard deviation (1.359).

4.5. Testing the study hypotheses and analyzing the results:

This section shows the results of statistical tests related to the hypotheses as follows:

4.5.1. Testing the relationship between Sustainable Supply Chain Management and Environmental performance of retail petrol stations in Saudi Arabia:

"There is no significant relationship between the applying of Sustainable Supply Chain Management and the Environmental performance of retail petrol stations in Saudi Arabia". To test this hypothesis, the Pearson coefficient will be used for correlation analysis and table (4/26) can show the results of this test as follows.

Table (13) Matrix correlation coefficients between the basic Variables (X & Y)

	Statistics	Sustainable Supply Chain Management (X)	Environmental performance of retail petrol stations in Saudi Arabia (Y)
Sustainable Supply Chain Management (X)	Correlation coefficient (Pearson)	1	.697**
Environmental performance of retail petrol stations in Saudi Arabia (Y)	Significance level		0.000
	Correlation coefficient (Pearson)	.697**	1
	Significance level	0.000	
	Significance level (0.01)		

(Source: researcher's calculation).

- The table (13) can illustrate the strong positive correlation between the basic variables (X, Y) (Sustainable Supply Chain Management & Environmental performance of retail petrol stations in Saudi Arabia), as the correlation coefficient is (0.697**) according to the correlation of Person, and at a significance level of (1%). It is also noted that there is an assurance related to the validity of the statements that can be used to measure the study variables, therefore the basic variables (X, Y) are really correlated.
- It is noted from previous correlation results that the second hypothesis "There is no significant relationship between applying Sustainable Supply Chain Management and the Environmental performance of retail petrol stations in Saudi Arabia" can be rejected and accept alternative hypothesis that there is significant relationship between applying Sustainable Supply Chain Management and the Environmental performance of retail petrol stations in Saudi Arabia.

4.5.2. Testing the impact of Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia:

“There is no significant impact of applying Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia”. The table (14) illustrates the results of multiple regression analysis as follows:

Table (14) The results of multiple regression test related to the most important variables affecting the Environmental performance of retail petrol stations in Saudi Arabia

Symbol	Variables	Unstandardized coefficients		Standardized Coefficients	T	P-value	TOL	VIF
		B	Std. Error					
X1	Economic Sustainability.	0.093	0.060	0.124	1.551	0.123	0.404	2.478
X2	Environmental Sustainability	0.147	0.051	0.233	2.866	0.005	0.389	2.569
X3	Social Sustainability.	0.177	0.048	0.218	3.705	0.000	0.743	1.347
Constant				1.075				
Correlation coefficient (R)				.714				
Determination Coefficient (R ²)				.509				
Adjusted determination coefficient (Adj.R ²)				.494				
F-test				32.871				
P-value				0.000				

(Source: researcher's calculation).

- Table (14) explains the significance of the model in testing the most important variables affecting the dependent variable (Y), as (F-test) is (32.871) and (P-value) is (0.000), which can show that the model is valid for predicting the value of (Y) and the results have a statistical significance as the significance level is (0.000) less than (5%), which helps us in making the decision. Moreover, the variance inflation factor (VIF) for each variable is less than (10) and tolerance (T) is greater than (0.1) for each variable, meaning that there is no multi-collinearity among the explanatory variables so the researcher can rely on the results of this model. There is a high correlation (.714) between the independent variables in the previous table and the dependent variable (Y: Environmental performance of retail petrol stations in Saudi Arabia), and the determination coefficient (R²) reveals that the

explanatory variables are contributing to explain 50.9% of the variation in (Y) dependent variable.

- The results show that the variables (Social Sustainability, Environmental Sustainability) have a positive impact on the dependent variable (Y: Environmental performance of retail petrol stations in Saudi Arabia) at 5% significance level. We can use the following equation to illustrate the main result obviously:

$$Y = 1.075 + 0.093X_1 + 0.147X_2 + 0.177X_3$$

Therefore, we can refuse the third hypothesis: "There is no significant impact of applying Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia "and accept the alternative hypothesis that there is a significant statistical impact of applying Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia.

Chapter Five

Results and Recommendations

5. Results and Recommendations:

5.1.Results:

- The study data does not follow the normal distribution, so the researcher can use nonparametric tests to prove the hypotheses validity and achieve more accurate results.
- Cronbach's Alpha test declared the validity of study tools, and then the researcher can trust it to achieve the study goals.
- The descriptive analysis illustrated that there is an agreement in the study sample opinions related to the basic variables included (Economic Sustainability, Environmental Sustainability, Social Sustainability. The impact of Sustainable Supply Chain Management on the Environmental performance of retail petrol stations in Saudi Arabia, Benefits of Sustainable Supply Chain Management for a company's business, The impact of Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia).
- The results illustrate the strong positive correlation between the basic variables (X, Y) (Sustainable Supply Chain Management & Environmental performance of retail petrol stations in Saudi Arabia), as the correlation coefficient is (0.697**) according to the correlation of Person, and at a significance level of (1%). It is also noted that there is an assurance related to the validity of the statements that can be used to measure the study variables, therefore the basic variables (X, Y) are really correlated.
- there is a significant statistical impact of applying Sustainable Supply Chain Management on Environmental performance of retail petrol stations in Saudi Arabia.

5.2.Recommendations:

Based on the results of the study, the following eight recommendations can be made:

- **Enhance Environmental Sustainability Practices:**
 - Retail petrol stations in Saudi Arabia should prioritize environmental sustainability practices as they have a significant positive impact on environmental performance.

This includes reducing emissions, improving waste management, and adopting cleaner energy sources.

- **Strengthen Social Sustainability Initiatives:**

- Given the positive impact of social sustainability on environmental performance, companies should invest in social programs that benefit both employees and local communities. This could include community engagement initiatives, fair labor practices, and social responsibility programs.

- **Promote Economic Sustainability:**

- Although the impact of economic sustainability on environmental performance was not found to be significant, it should not be overlooked. Petrol stations should aim to balance economic goals with environmental and social objectives to achieve long-term sustainability.

- **Implement Comprehensive Sustainable Supply Chain Management (SSCM):**

- The significant relationship between SSCM and environmental performance suggests that retail petrol stations should fully integrate sustainable practices across their supply chain. This includes selecting suppliers committed to sustainability and reducing the environmental impact of logistics and procurement.

- **Continuous Monitoring and Evaluation:**

- To ensure the effectiveness of sustainability initiatives, petrol stations should establish continuous monitoring and evaluation mechanisms. Regular assessments will help in identifying areas for improvement and ensure that sustainability goals are being met.

- **Increase Awareness and Training:**

- Companies should invest in training programs to increase awareness and understanding of sustainability among employees. Educating staff about the benefits and practices of SSCM can lead to better implementation and enhanced environmental performance.

- **Leverage Technology for Sustainability:**

- The adoption of advanced technologies can significantly enhance sustainability efforts. Retail petrol stations should explore the use of digital tools and innovations,

such as IoT for energy management, to improve efficiency and reduce environmental impact.

- **Engage Stakeholders in Sustainability Efforts:**

- Collaboration with stakeholders, including customers, suppliers, and regulatory bodies, is essential for achieving sustainability goals. Petrol stations should engage stakeholders in dialogue and partnerships to drive collective action towards better environmental performance.

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Appendix

Questionnaire for Research Variable

Section one: Demographic Information				
Gender	Male	Female		
Job title at work	Owners	Manager		
Length of Work in the Company	2 to < 5 years	5 to < 8 Years	8 to < 10 Years	Ten years over
Number of Workers Fuel Station	20 to < 60 Employees	Over 100 Employees		

Section two: Independent variable: Sustainable Supply Chain Management

No	Question	5 Likert Scale				
		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Economic Sustainability						
1	Fuel Station's material procurement costs have decreased					
2	Fuel Station's energy consumption costs have decreased					
3	Fuel Station's waste management charges have decreased					
4	Fuel Station has reduced the charges paid for the disposal of wastes					
Environmental Sustainability						
1	Fuel Station reduced the amount of wastewater					
2	Fuel Station reduced the amount of solid waste					
3	Fuel Station reduced the number of environmental accidents					
4	Fuel Station improved its environmental management system and practices					
Social Sustainability						
1	Fuel Station implements occupational health and safety, work standards compliance, and audit systems for our supply chain partners					
2	Fuel Station develops systems of professional ethics with our supply chain partners					
3	Fuel Station and supply chain partners have reduced the health risk that consumers may encounter					

4	Fuel Station has benefited employees throughout the supply chain					
5	Fuel Station and supply chain partners have reduced occupational safety and health risks in new products/processes developed over the last two years					
6	Fuel Station carries out supply chain strategy changes that minimize adverse impacts					

Section three: Dependent Variable: Environmental Performance

No	Question	5 Likert Scale				
		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Environmental Performance						
1	Fuel Station has reduced consumption of hazardous/toxic material					
2	Fuel Station has reduced air emissions					
3	Fuel Station has reduced effluent wastes					
4	Fuel Station has sought to improve its environmental image/position					
5	Fuel Station has reduced energy consumption					