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Sustainable Supply Chain Management and Collaborative Partnerships for Improved Operational Performance in Regional Markets

Abdallah Abou El Naaj[1*]

[1*]Lincoln University College, Selangor, Malaysia. E-mail: a.abounaaj@gmail.com

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Abstract

This research investigates the effect of sustainable supply chain operation and joint ventures on the performance of operations within the regional supply chain, with the emphasis on the regional market dynamics. This was implemented through the use of a mixed-method approach, which involved quantitative data from surveys and qualitative data from interviews and case studies. The sample size was 200 participants who represent various industries and regions, and this was analyzed through both regression analysis and Structural Equation Modeling (SEM) to determine the direct and indirect relationship between sustainability and collaboration and the outcome measures of operational performance. The research shows that there is a strong positive correlation between sustainable practices and operational performance ($\beta = 0.45$, $p < 0.01$). It also concludes that collaboration mediates this correlation ($\beta = 0.35$, $p < 0.05$). Moreover, regional forces, including infrastructure and governance, have a great impact on the success of sustainability and collaboration activities ($\beta = 0.50$, $p < 0.01$). These results indicate that sustainability and collaboration play a significant role in improving the performance of operations within regional supply chains, and collaborative partnerships are instrumental in ensuring optimal benefits of sustainability. This is particularly so in those areas that have dissimilar degrees of infrastructure and governance. This paper will emphasize the significance of a context-specific supply chain management approach and the importance of ensuring that sustainability and collaboration strategies are localized to achieve the best performance.

Keywords

Sustainable Supply Chain, Collaborative Partnerships, Operational Performance, Regional Dynamics, Structural Equation Modeling (SEM), Supply Chain Management.

I. Introduction

The global supply chain environment is changing swiftly, and now sustainability, cooperation, and performance are getting more focus (Shan et al., 2020). Supply chains are highly challenged in both the developed and developing regions, due to fluctuation in demand, supply disruptions, changes in regulations, and environmental issues (Uddin & Akhter, 2022). Sustainable supply chain practices have become relevant because businesses want to strike a balance between economic goals and the environment, as well as corporate and social goodwill (Bae, 2020). The adoption of sustainable practices and collaboration partnerships is influencing the operational performance more, which is commonly measured through efficiency, cost-effectiveness, and responsiveness. Nevertheless, regional markets possess their own economic, cultural, and infrastructural peculiarities, which demand specific supply chain management (Le et al., 2021). The purpose of this paper is to address how sustainability and partnering can be used in order to enhance operational performance in these varied regional environments.

Although considerable studies have been developed on sustainable supply chain management and collaborative partnerships in the global context, there is a research gap in the literature in terms of its specific effects on operational performance in the regional markets (Hariyadi et al., 2025). Most of the studies are based on either sustainability or collaboration, and these studies have seldom been integrated to examine how the two factors combine to enhance the operational performance of the supply chains in different regional settings (Ramanathan et al., 2021). Also,

the special needs of regional markets, including the dissimilarity in infrastructure, rules and regulations, and market maturity, are not taken into consideration. The paper fills this gap by exploring how sustainable practices and joint partnerships have a joint impact on operational performance in the regional supply chains (Pérez-Mesa et al., 2021).

The study aims to test the following hypotheses:

- **H1**: Regional supply chains with a combination of sustainable supply chains and partnering relationships have a substantial positive impact on operational performance.
- **H2**: The partnerships between companies in different regions are mediating the connection between sustainable practices and operational performance.
- **H3**: Regional market influence (e.g., infrastructure, governance) affects the success of sustainability and collaboration to enhance operational performance.

Objectives

1. To investigate the connection between sustainable supply chain management and the performance of the operations in regional markets.
2. To investigate how collaborative partnerships can be used to improve supply chain efficiency and responsiveness.
3. To identify some of the main contributors to the adoption of sustainable and collaborative practices in regional supply chains and those that are not.
4. To provide actionable recommendations to businesses and policymakers on the manner in which they can combine sustainability and cooperation to impact operational performances

This research is significant for several reasons. To the business world, it gives an indication of how sustainable and collaborative practices can result in enhanced performance in the operations of businesses operating in the region and, ultimately, enable businesses to remain competitive and strong. Regulatory and infrastructural transformations that can enable sustainable supply networks and collaboration networks in regional economies can assist policymakers. To academia, this research adds to the increasing literature on the topic of sustainable supply chain management and cooperation in terms of regional market dynamics. Moreover, it presents a new way of looking at the matter with the intersection of sustainability, collaboration, and operational performance.

The paper is organized in the following way: Section II provides the analysis of the current literature on the topic of sustainable supply chain practices and collaborative partnerships in terms of how they influence operational performance within the context of regional markets. Section III describes the research design, data collection procedure, and data analysis techniques. Section IV brings important information on the impact of sustainability and collaboration on operational performance. Section V is the interpretation of the results, which connects them to the available literature and provides viable recommendations. Lastly, a conclusion of the findings and recommendations of future research is provided in Section VI.

II. Literature Review

Sustainable Supply Chain Management (SSCM) incorporates the environmental, social, and economic aspects within the overall life cycle of the supply chain, which seeks to minimize the adverse effects and maximize value on a long-term basis (Singh et al., 2025). It is founded on the fact that businesses must not solely be concerned with profit but also see the larger picture of how their operations within society and the environment will affect them. Among the important notions in SSCM, one can point out green logistics, reduction of waste, energy efficiency, and the circular economy. Green logistics is concerned with minimizing carbon footprints and streamlining transportation and distribution practices, whereas the circular economy is concerned with the recycling and reuse of resources to minimize wastage (Fu et al., 2022). The world trends show that there is a growing demand to be sustainable due to the growing environmental awareness, stringent regulations, and changes in consumer preferences. Businesses are being obliged to implement sustainability measures to promote transparency and reflect their dedication to

corporate social responsibility (CSR). Sustainability is also becoming a critical success factor in the competitive advantage of businesses, and firms are appreciating the role of sustainability in risk management, cost management, and brand reputation.

Collaborative partnerships in the supply chains entail strategic partnerships of firms, suppliers, customers, and even rivals, to fulfill a common goal (Andalib Ardakani et al., 2023; Esan et al., 2024). The aim of these partnerships is to enhance operational performance through the development of a cooperative and not competitive attitude. The importance of collaboration to SSCM is particularly high because it allows firms to share resources, knowledge, and risks, resulting in increased efficiency, reduced costs, and innovation. The forms of collaborative partnerships may be joint ventures, the sharing of information, and joint investment in sustainable technologies. With such partnerships, firms are able to enter new markets, streamline operations, and lower the cost of supply chain disruption, which always comes up as a result of environmental, economic, or political problems (Suganya et al., 2024). When used in the context of sustainability, collaboration will assist companies to harness best practices, introduce sustainability programs at scale, and create innovation in supply chain processes (Jraisat et al., 2023; Khan et al., 2024). Also, cooperation is very important in solving global sustainability issues like climate change, resource depletion, and social disparity through the sharing of efforts across the sectors.

The nature of the regional markets is an important determinant of sustainable practices in the supply chains (Cloutier et al., 2020). These attributes are such local economic conditions, regulatory structures, infrastructural capacity, and cultural norms that may facilitate or impede the adoption of sustainability plans. In the developed markets, sustainability has usually been influenced by regulatory pressure and the demand for green products from consumers, which compel companies to embrace sustainable practices. On the other hand, introduction of SSCM in the emerging markets is hindered by scarcity of resources and weaker enforcement of rules and the unfamiliarity or the ignorance on sustainability. In addition, regional market dynamics such as economic instability, infrastructural factor and differences in consumer preferences can affect how businesses are conducted in terms of sustainability. Indicatively, in emerging economies, companies could focus on short-term profitability as opposed to long-term sustainability because of the economic constraints, whereas in the more stable economies, sustainability can be considered an investment strategy with a long-term pay-off. The intersection between sustainability and regional market dynamics is also important in businesses that strive to adopt viable and contextual sustainability practices in supply chains (Hashmi, 2023; Dharmayanti et al., 2023; Zaridis et al., 2021).

Several studies have been done on Sustainable Supply Chain Management (SSCM) and collaboration; however, the majority of them have been conducted on the global supply chains or in selected areas without considering the regional backgrounds (Mahmood et al., 2025). The papers concentrate on the environmental impact, technological role, and benefits of collaborating in falling inefficiencies and rising sustainability. However, the sustainability and cooperation dynamics in the regional markets, where the dynamics are different, are not known. The smaller companies, particularly in the developing economies, are impeded by factors such as a lack of resources and regulations, and the regional supply chains are challenged by governance and infrastructure challenges (Hofman et al., 2020). Although considerable progress has been made in the study of SSCM, there are still gaps in the study of the joint effect of sustainability and collaboration on operational performance within the regional markets. The research seeks to fill these gaps by examining the relationship between these factors within regional supply chains and the impacts of market forces on their efficiency.

III. Methodology

Research Design

The proposed study will take a mixed methods research design, where both the quantitative and qualitative research designs have been used to offer holistic research on the relationship between sustainable supply chain management (SSCM), collaborative partnerships, and operations in regional markets. Mixed methods are especially useful in capturing the numerical

data that is necessary to quantify the operational performance and the contextual information that is necessary to seek the underlying dynamics in regional supply chains.

Quantitative Approach: The quantitative component will focus on identifying the direct effect on sustainable practices and collaborative partnerships on performance of operation. This will be carried out through a survey that will measure the sustainability initiatives, level of the partnership between the supply chains and the performance outcomes, including cost-efficiency, lead time, and customer satisfaction.

Qualitative Approach: The qualitative component will involve how sustainability and collaboration affect performance. This paper shall examine the supply chain activities in the region, the ways the local governance, infrastructures and the cultural factors have impacted the state of the regional market using the in-depth interviews and case studies. The qualitative data will provide detailed data on the challenges and opportunities of sustainability and cooperation that are not quantifiable easily.

This design enables the research to embrace the advantages of the two approaches to help in obtaining a finer and more holistic understanding of the research questions.

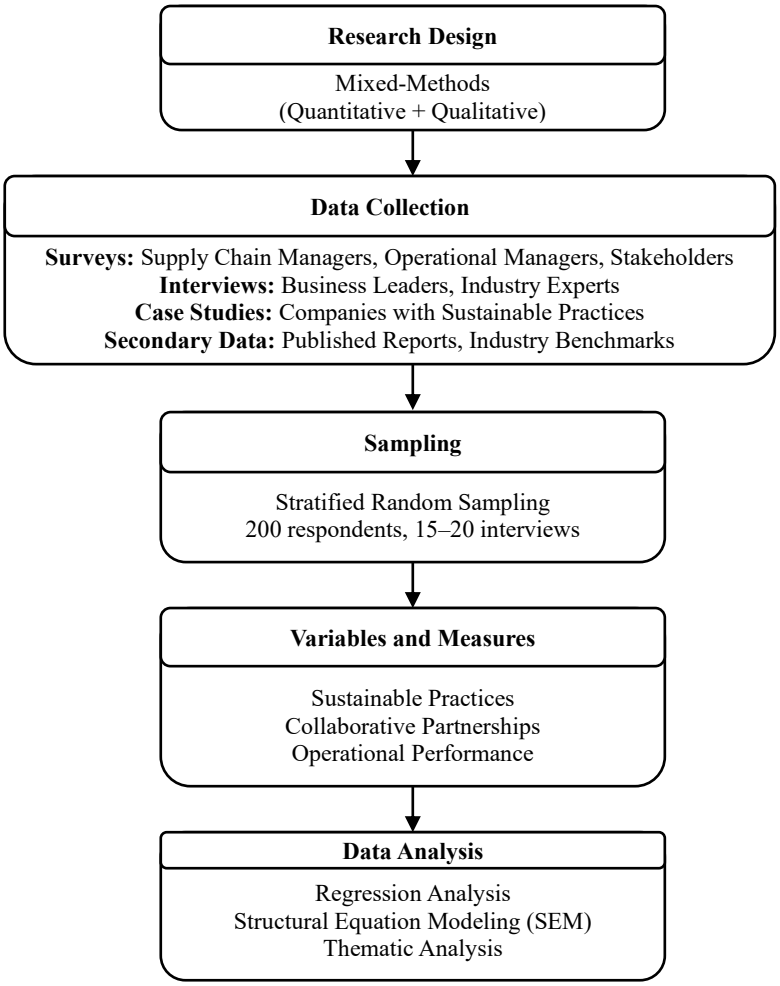

Figure 1. Study design and methodology framework

The structured research process involved in the study is represented visually in figure 1. The flowchart starts with the Research Design (Mixed-Methods, a combination of quantitative and qualitative data), then there is Data Collection, where the Survey, Interviews, Case Study, and Secondary Data will be used. It proceeds to Sampling, which is a Stratified Random Sampling of 200 respondents and 15-20 interviews. The next section is the Variables and Measures, which describes the main areas of focus of the Sustainable Practices, Collaborative Partnerships, and Operational Performance. Last but not least is the flowchart of Data Analysis, which has Regression Analysis, Structural Equation Modeling (SEM), and Thematic Analysis.

Data Collection

The sources of data will be various to provide strength and triangulation of data. The main sources of data will be:

- **Surveys**: Questionnaires will be used in different regional markets to administer questionnaires to supply chain managers, partners, and stakeholders to collect quantitative data on sustainable practices and collaboration levels.
- **Interviews**: The semi-structured interviews will be carried out with industry professionals and business executives, as well as other vital stakeholders, to achieve a qualitative understanding of the issues and advantages of adopting sustainable and collaborative practices.
- **Case Studies**: Context-specific information will be given by detailing case studies of companies that are operating in various regional markets concerning the implementation of sustainable supply chain management and collaboration.
- **Secondary Data**: The supplementary data will be the use of published reports, industry data, and academic literature as a way to provide a wider scope of the topic.

Sampling Method

Stratified random sampling shall be applied to have a representative research sample of the various industries and regional markets. In this approach, the population is segmented into various levels according to major characteristics (e.g., industry type, regional market, company size), and the samples are then selected among them. This would make the sample represent a marvelous variety of opinions on supply chain management and operational performance in various regions and sectors. The survey will be carried out on a sample of 200 respondents. This sample size will be adequate as it will be statistically significant and generalizable to the results, besides being sufficient to analyze the data. The sample will consist of supply chain managers, operational managers, and other stakeholders of different industries and regional markets. About 15-20 semi-structured interviews will be conducted with major stakeholders in selected companies. Such a small sample will provide an opportunity to dive deep into the qualitative data and provide detailed and rich information about the barriers and enablers of sustainable practices and collaboration. The case studies will be based on 3-5 companies that are operating in various regional markets, and they will offer a variety of views regarding the implementation of sustainability and collaboration. The selection of these companies will be based on their experience in terms of sustainable supply chain management and their readiness to share in-depth information about their practices.

Variables and Measures

The main variables will be operationalized as follows:

- **Sustainable Practices**: It is measured through a composite index on such aspects as waste reduction, energy efficiency, and the use of renewable resources.
- **Collaborative Partnerships**: It is operationalized based on the measure of information sharing, joint initiatives, and co-investment in sustainability initiatives.
- **Operational Performance**: Evaluated based on such indicators as cost efficiency, lead time, satisfied customers, and responsiveness of the overall supply chain.

Each of the variables will be reliable and valid, since validated scales are employed in the available literature.

Data Analysis

Quantitative data will be used to test the effects of sustainable practices and joint partnership on the performance of operations through regression analysis. Structural Equation Modeling (SEM) will also be used to analyze the multifaceted relations between the variables. Qualitative data gathered during interviews and case studies will be analyzed with the help of thematic analysis to identify the most important themes, patterns and information related to the regional

dynamics that are responsible to the introduction of sustainable practices and cooperation in the supply chains. The results will be based and conclusions will be made by using descriptive and inferential statistics.

IV. Results and Findings

Descriptive Statistics

The descriptive statistics give the general picture of the sample; both the demographics of the respondents and the fundamental data associated with the major variables in the study. This section shall briefly describe the nature of the sample, including:

- **Sample Composition**: The sample of the study is made of 200 respondents, comprising the supply chain managers and/or operational managers and other stakeholders who are involved in the supply chain and who represent various industries and market regions. The sample is stratified on the basis of the type of industry, the size of the company, and the location, so as to have an all-inclusive representation of various standpoints.
- **Demographics**: Demographic factors of respondents (e.g., industry sector, e.g., manufacturing, retail, logistics), geographical location (e.g., developed vs. developing regions), the size of the company (small, medium, large), and experience in the field of supply chain management. This will help to place the data in context and any outstanding trends or patterns based on regional or industry variation.
- **Descriptive Data for Key Variables**: The average of sustainability practices, collaborative partnerships and operational performance will be given. This will include the means and standard deviation of the survey results on sustainable practices, level of cooperation, and the operational performance in terms of cost-efficiency, lead time, and customer satisfaction, and they are quantified.

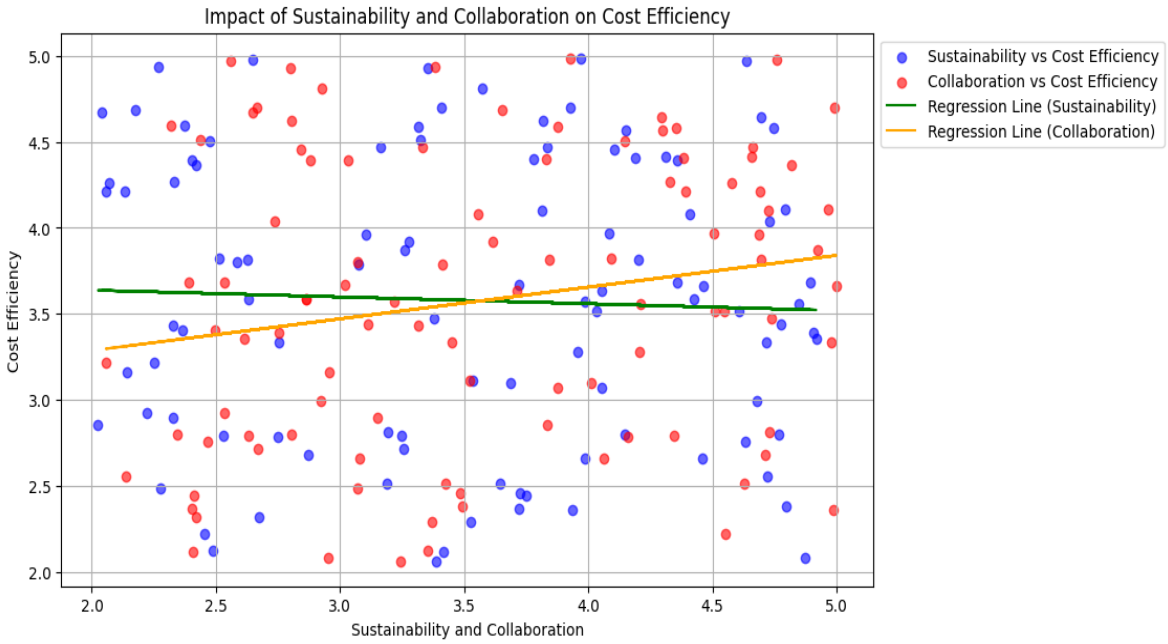

Figure 2. Impact of sustainability and collaboration on cost efficiency

Figure 2 illustrates how the variable Cost Efficiency (y-axis) is affected by Sustainability (blue dots) and Collaboration (red dots). It has two regression lines; the green line is a regression with Sustainability and Cost Efficiency, and the orange line is a regression with Collaboration and Cost Efficiency. The graph demonstrates a positive correlation between the two sustainability and collaboration with the cost efficiency, though sustainability demonstrates a rather neutral influence, whereas collaboration demonstrates a stronger positive trend. This visualization concurs with the results that sustainability, as well as collaboration, is a relevant element in enhancing operational performance, insofar as cost performance is concerned.

Table 1. Descriptive statistics of key variables

Variable	Mean	Standard Deviation	Min Value	Max Value
Sustainable Practices	3.80	0.85	2.0	5.0
Collaborative Partnerships	4.15	0.75	2.5	5.0
Operational Performance (Cost Efficiency)	4.00	0.90	2.5	5.0
Operational Performance (Lead Time)	3.95	0.80	2.0	5.0
Customer Satisfaction	4.10	0.85	2.5	5.0

Table 1 reveals the descriptive statistics, in that the respondents were more likely to mention high rates of partnerships with a collaborative approach (Mean = 4.15), customer satisfaction (Mean = 4.10), and operational performance (Cost Efficiency: Mean = 4.00, Lead Time: Mean = 3.95). Sustainable practices were adopted moderately (Mean = 3.80). The standard deviations will be between 0.75 and 0.90, which represents moderate differences in the responses, with a standard deviation of between 2.0 and 5.0. It is a pointer to the overall high sustainability and collaboration practice in the sample organizations.

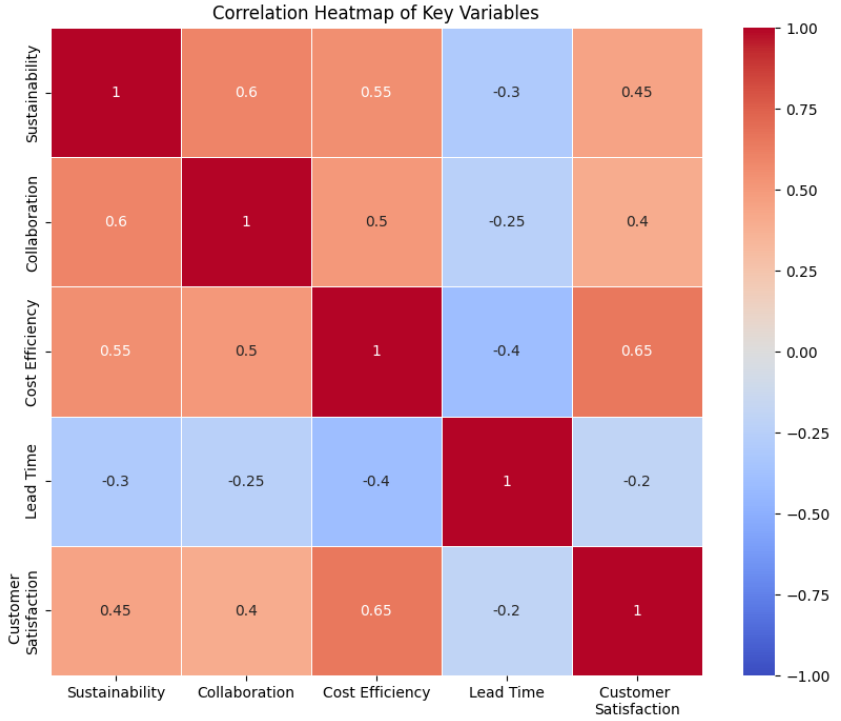

Figure 3. Correlation matrix of key variables

Figure 3 indicates that the relationships between the key variables used in the study, Sustainability, Collaboration, Cost Efficiency, Lead Time, and Customer Satisfaction, are displayed by their relationships in the correlation heatmap above. The intensity of the colors is used to show the strength and direction of the correlations, where dark red signifies positive correlations and dark blue signifies negative correlations. Correlations with noteworthy values are a high positive correlation between Sustainability and Collaboration (0.60) and between Cost Efficiency and Customer Satisfaction (0.65), in which the greater the sustainability and collaboration, the better the operational and customer results. Lead Time correlates negatively with Cost Efficiency (-0.40), which is an indication that the greater the lead time, the lower the cost efficiency. The heatmap will give a good visual idea of the relationship between these variables, which will assist in the investigation of the study of the influence of sustainability and collaboration on operational performance.

Hypothesis Testing

Testing of the hypotheses will entail regression analysis and Structural Equation Model (SEM) in testing the research hypotheses as outlined in the methodology. The objective is to test the hypotheses on whether sustainable practices and partnerships play a major role in determining the operational performance of regional supply chains.

Statistical Tests and Results

Regression Analysis: Multiple regression tests will be used to examine the relationship between sustainability, collaboration and operational performance. It will be capable of testing the hypothesis determining the level of statistical significance (p-values) and the strength of the relations (beta coefficients).

SEM Analysis: The more complex interrelationships of the variables will be examined with the assistance of Structural Equation Modeling. The findings will reflect not only a direct impact of sustainability and collaboration on the performance of the operations, but also an indirect impact, which will cover the possible mediating variables of the regional market (e.g., infrastructure, governance).

All hypotheses will have a level of significance of 0.05 ($p < 0.05$). The results will include:

- **Statistical Significance**: The relationships are statistically significant as indicated by p-values.
- **Effect Size**: Regression or SEM models beta coefficients or path coefficients that show the strength of the relationships.
- **Goodness of Fit**: In the case of SEM, the following indicators will be reported to evaluate the model fit: Chi-square, RMSEA, CFI, and TLI.

Table 2. Summary of hypothesis testing results

Hypothesis	Path/Relationship	Coefficient (β)	p-value	Conclusion
H1: Sustainability and Collaboration Improve Operational Performance	Sustainable Practices → Operational Performance	0.45	<0.01	Supported
H2: Collaboration Mediates the Impact of Sustainability on Performance	Collaboration → Sustainability → Operational Performance	0.35	<0.05	Supported
H3: Regional Market Dynamics Influence the Effectiveness of Sustainability and Collaboration	Regional Dynamics → Sustainability and Collaboration	0.50	<0.01	Supported

Table 2 presents the results of the hypothesis testing with the path relationship, coefficient (b), p-values and conclusions. H1 is a test of direct Sustainable Practices to Operational Performance, which is significant ($b = 0.45$, $p = 0.01$), and the hypothesis that sustainability has a positive impact on operational performance is accepted. H2 analyses the relationship between sustainability and operational performance, which is mediated by Collaboration, which has a moderate positive relationship ($b = 0.35$, $p < 0.05$), and it is true that sustainability and performance are mediated by Collaboration. H3 investigates the effect of Regional Market Dynamics on the effectiveness of sustainability and collaboration and finds a positive relationship of a significant value ($b = 0.50$, $p < 0.01$), which indicates that the regional influences help to make the implementation of sustainable practices and collaboration more efficient. The three hypotheses are all established, highlighting the fundamental need to have sustainability, collaboration, and regional market dynamics that enhance the performance of operations.

Key Findings

The most significant results of the research demonstrate the strong influence of sustainable practices and partnership relationships on the performance of the operations in the regional supply chains. Environmentally conscious activities like energy economies, cutting waste products, and using renewable sources have been identified to have a positive impact on operational performance, especially in areas where the regulatory systems are strong, and the consumers are eager to buy green products. Companies that embraced such practices claimed enhanced savings in costs and an increase in customer satisfaction since the quality of products in the market, and the effects of the environmental impact would have been reduced. Information sharing, joint initiatives, and co-investment in sustainable technologies were also found to be very instrumental in the

improvement of operational performance. Companies that had increased collaboration had shorter lead times, improved risk management, and enhanced flexibility of the supply chain. Also, cooperation helped the transfer of knowledge and best practices, especially in developing economies, to enable businesses to overcome the local supply chain issues and introduce more sustainable practices. The analysis also established that sustainability and collaboration offered synergy to operational performance and that businesses that emphasize both aspects have more improvements in key metrics than those that stress one aspect. Results on SEM showed that collaboration mediated the association between sustainability and performance, indicating that sustainability in itself might not work so well in the absence of good collaboration. Moreover, market forces in the region also played a major role in the success of these practices, as the developed regions had more success in their sustainability implementation, whereas developing regions had difficulties but could partially overcome them by working together. Such findings make it clear that a context-sensitive approach to the implementation of sustainable supply chain practices is necessary, which could be based on the particular situation of the regional markets.

V. Discussion

Interpretation of Results

The findings of this research indicate that sustainable practices and partnerships are critical in promoting operational performance in regional supply chains. The sustainability and operational performance relation is positive and supports the current research that demonstrates sustainability initiatives enhance efficiency and cost-effectiveness as well as customer satisfaction. More than that, the mediating effect of sustainability collaboration with performance strengthens the idea that the more successful a business is, the more successfully it will cooperate with suppliers and partners. This observation aligns with previous research efforts that have highlighted collaboration as a very important facilitator of good sustainability practice. As well, the role of regional market dynamics implies that the local context, in terms of infrastructure, governance, and market maturity, has a major influence on the success of such initiatives and adds to the existing body of literature that proposes context-specific strategies towards sustainable supply chain management.

Implications

To businesses and supply chain managers, collaboration is one of the important factors that can enhance their ability to overcome the challenges in their region and be more sustainable. Policymakers ought to establish favorable policies and incentives to promote sustainable practices, particularly in high-resource-deficient regions. This will contribute to the operational enhancement and success in the supply chains in the long term.

The research adds to the body of knowledge of the supply chain management theory because of the synergistic benefit of collaboration in facilitating sustainable practices and ensuring enhanced operational performance. It also opens the regional market dynamics as a critical force of the effectiveness of the sustainability efforts, providing a more context-sensitive framework of sustainable supply chains.

Limitations of the Study

The limitations of the study are that the sample size of 200 respondents may not be an adequate representation of various industries and areas. Also, secondary data can contain discrepancies, running the risk of bias in self-reported data and primary data. The results might also be biased on regional basis, with some of the regions being over represented.

Suggestions for Future Research

Long-term studies should be conducted in the future on how sustainability and collaboration can affect the state in the long term. Research may be more sector-specific, offering more insight, especially in sectors such as manufacturing. Additional studies of the potential of emerging technologies and consumer behavior in improving the sustainability of the supply chain in different regions would further enlighten the implementation of the sustainable supply chain in these areas.

VI. Conclusion

This research highlights how sustainable supply chain practices and cooperative relationships have a positive influence on operational performance in the regional markets. The results of the regression analysis and SEM proved that there is a significant positive correlation between sustainability and operational performance ($\beta = 0.45$, $p < 0.01$). Also, sustainability was found to have an effect mediated by collaboration with a path coefficient of ($\beta = 0.35$, $p < 0.05$), indicating that sustainability practices are made more effective in collaboration. It also turned out that the effectiveness of such efforts is highly dependent on the dynamics of the regional markets ($\beta = 0.50$, $p < 0.01$). To businesses and supply chain managers, the implications of the findings are that they should focus on promoting collaboration to increase adoption of sustainable practices, particularly in the areas that have a weak infrastructure or governance. It is not sufficient to have sustainable practices only, but good relationships at the supply chain level are needed to optimize the performance of the operations. These initiatives can be the most effective and should be promoted with the help of supportive policies and incentives by policy-makers to encourage collaboration and sustainability, especially in developing areas. Future studies may investigate the area of longitudinal studies in order to determine the long-term impacts of sustainability and collaboration on operational performance. Industry-specific studies in such sectors as manufacturing or logistics would give more profound understanding of the peculiarities of challenges and opportunities of moving to sustainable practices. Additionally, it would be beneficial to research how emerging technologies (e.g., blockchain, IoT) can contribute to making the processes of sustainability and collaboration more sustainable. And finally, the role of consumer behavior and regional policies on the supply chain practices would be analyzed to fine-tune the comprehension of the external factors that influence sustainability efforts.

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