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The Impact of Lean Supply Chain Practices on Cost Performance among SMEs in Ghana

Stephen Kwablah Agbedam

Kwame Nkrumah University of Science and Technology, Kumasi Ghana

https://orcid.org/0009-0001-9279-5036

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Abstract

Purpose: Lean supply chain practices have become a strategic approach to enhance cost performance through process optimization, waste reduction, and continuous improvement. However, empirical research on the relationship between lean supply chain practices and cost performance in Ghana's Small and Medium-sized Enterprises (SMEs) is limited. This study investigates the association between lean supply chain practices and cost performance among Ghanaian SMEs.

Methodology: A quantitative research design was employed, with data collected through self-administered questionnaires from 133 staff, employees, and consumers from SMEs in the Greater Accra region.

Findings: The findings reveal a statistically significant positive relationship between lean supply chain practices and cost performance. Correlation analysis showed a substantial relationship between the two dimensions, and regression analysis confirmed that lean practices had a meaningful impact on cost outcomes.

Unique Contribution to Theory, Policy and Practice: The findings emphasize the need for SMEs to move beyond discrete, lean technologies and adopt more integrated, collaborative supply chain methods to fully capitalize on the strategic potential of lean as a system-wide approach to performance improvement.

Keywords: *Lean Supply Chain, Cost Performance, SMEs, Supply Chain, Cost Reduction, Operational Efficiency, Process Optimization, Waste Reduction*

Introduction

In today's competitive and globalized business climate, supply chain management drives organizational success and resilience (Sawyerr and Harrison, 2020; Jaboob *et al.*, 2024). Firms are under growing pressure to streamline processes and decrease costs while maintaining quality as sourcing, production, and distribution networks become more complicated (Oteri *et al.*, 2023). These dynamics are fundamental in emerging economies such as Ghana, where supply chain inefficiencies impact firm-level performance and overall economic results. The strategic objective to optimize supply chains is thus not only a business requirement but also a development priority (Hines, 2024).

Ghana's Small and Medium-sized Enterprises (SMEs) sector is crucial to national growth, accounting for around 90% of all business entities and 80% of total employment, contributing over 60% to gross domestic product (GDP) (Bamfo, 2024). According to data from the Ghana Statistical Service, the informal sector, primarily driven by SMEs, added GHS 156.75 billion to nominal GDP in 2022, a 31.86% rise from the previous year and 25.69% of overall GDP. The sector's real GDP growth of 4.23% in 2022, at GHS 48.81 billion, underscores its significance (Ghana Commercial Bank, 2023). Despite their economic significance, Ghanaian SMEs continue to encounter operational issues, particularly in properly managing their supply chains.

These difficulties appear as frequent delays, inventory mismanagement, and increased logistics costs. For example, a World Bank (2019) assessment, as cited in Buabeng (2023), discovered that logistics expenses account for 19.2% of the total cost of goods sold in Ghanaian manufacturing enterprises, highlighting' a considerable cost burden in their supply chains. Furthermore, Amoako and Amoako (2025) indicated that 363 SME owners and managers found that 48% cited supply chain delays that disrupted production and sales cycles, reducing business continuity and market response. These inefficiencies are worsened by infrastructure restrictions such as inconsistent electricity, inadequate transportation networks, regulatory requirements, and talent shortfalls. Over 75% of SME owners describe infrastructure limitations as key productivity impediments, 65% cite compliance issues, and another 65% lack the formal managerial training required for modern supply chain methods (Osei, Boateng and Agyemang, 2020; Agyemang, Ansah and Manteaw, 2021). These systemic limitations continue to impair SMEs' competitiveness in domestic and international markets.

In response to these inefficiencies, lean supply chain approaches have gained popularity as a strategic approach to improving cost performance through process optimization, waste reduction, and continuous improvement. Just-in-time inventory, value stream mapping, and kaizen are lean methodologies extensively used in advanced economies to decrease operational waste and enhance efficiency (Ghelani, 2021; Burawat, 2024; Taher and Al Bashar, 2024). Literature supports the suitability of these strategies for SME contexts, particularly in developing nations where cost containment is critical (Burawat, 2024). On the other hand, the application of lean practices in

small and medium-sized enterprises (SMEs) in Ghana continues to be restricted due to the absence of locally applicable models, reluctance to change, and a lack of technical skill shortages. This underutilization prevents SMEs from achieving considerable waste and expense reductions, compromising their operational performance and long-term viability.

Despite the increased interest in lean principles, empirical research into the relationship between lean supply chain techniques and cost performance in Ghana's SMEs is limited. While global research has linked lean practices to increased operational efficiency (Khorasani, Cross and Maghazei, 2020; Ghelani, 2021; Kemunto and Anthony, 2024; Okpala et al., 2024), context-specific information from Ghana is limited. Moreover, the majority of existing research has focused on the manufacturing industry, which limits the generalizability of findings to other types of SMEs (Manzoor *et al.*, 2021; Buabeng, 2023; Burawat, 2024; Taher and Al Bashar, 2024). Mbugi and Lutego (2022) used a qualitative approach to investigate the impact of inventory control management systems on the organizational performance of manufacturing enterprises in Tanzania. According to the study, systems such as Economic Order Quantity (EOQ) have a favourable impact on cost reduction, production efficiency, operational flexibility, and profitability. However, using only a qualitative approach limits the findings' generalizability because it fails to reflect the broader application of the observed connections across diverse situations. This limited empirical knowledge impedes the creation of tailored actions to boost SME supply chains and increase cost competitiveness.

This study investigates the association between lean supply chain techniques and cost performance among Ghanaian SMEs. By investigating this link, the study aims to address a knowledge gap and provide evidence-based insights to influence SME policy, capacity-building programs, and lean implementation strategies relevant to Ghana's development setting.

Literature Review

Resource-Based View Theory

The Resource-Based View (RBV) theory, developed in strategic management, emphasizes a company's internal resources as the primary source of competitive advantage (Barney, 1991; Barney, Ketchen and Wright, 2021). Birger Wernerfelt presented it in his seminal 1984 book A Resource-Based View of the Firm. Wernerfelt stressed the importance of leveraging unique resources to gain a sustainable competitive advantage (Assensoh-Kodua, 2019). Jay Barney's efforts, particularly his 1991 essay "Firm Resources and Sustained Competitive Advantage," helped to popularize the notion. Miller (2019) states that Barney stated that valuable, rare, inimitable, and non-substitutable (VRIN) resources are critical for organizations to achieve long-term success. Edith Penrose's 1959 study, The Theory of Corporate Growth, emphasized the importance of internal capacity in corporate expansion (Hossain *et al.*, 2022), also serving as the foundation for RBV. Gerhart and Feng (2021) state that these scholars developed the Resource-

Based View (RBV) as a crucial paradigm for understanding how firms strategically exploit their resources to outperform competitors.

According to the RBV theory, a firm can achieve a long-term competitive advantage by leveraging resources from its external partners. Combining idiosyncratic resources from collaborating firms can result in distinctive, valuable, and unique resources that provide a competitive advantage (Wernerfelt, 1984). Enterprises that innovatively integrate money will profit from competition companies and cannot be beaten (Freeman, Dmytriyev and Phillips, 2021). Companies with minimal capital, assets, and superior core competencies will maintain a competitive advantage (Zahra, 2021). RBV claims that partner firms gain a strategic advantage by investing in comparable assets and their unique, valuable, non-substitute, and difficult-to-imitate existence (Barney, 1991). From a resource-based perspective, this study sees lean supply chain as an internal organizational competence that, when properly implemented, can result in cost savings, shorter cycle times, improved quality, and increased efficiency.

Lean Supply Chain Practices and Cost Performance

Lean supply chain practices have been shown to reduce costs and enhance efficiency across sectors (Benah et al., 2020; Manzoor et al., 2021; Buabeng, 2023; Kemunto and Anthony, 2024). Okpala et al. (2024) found that Kaizen concepts can result in lasting cost savings and operational improvements. Kaizen emphasizes constant improvement and waste minimization. It provides a methodical strategy for attaining cost savings and improving organizational performance. Burawat (2024) discovered that Thailand manufacturing organizations used a Just-In-Time (JIT) system to cut costs by lowering inventory levels and ensuring timely deliveries. Raw materials were obtained in response to customer orders, with regular supplier delivery reducing storage costs. Truck routes were also optimized, with return trips to avoid empty runs, resulting in cheaper transportation costs and better overall supply chain performance. Lean supply chain strategies have been demonstrated to lower costs and remove waste in healthcare supply chain systems (Khorasani, Cross and Maghazei, 2020).

Taher and Al Bashar (2024) demonstrated that lean manufacturing can be beneficial. Incorporating real-time data monitoring yields significant benefits, including faster production, higher-quality products, and lower expenses. It lowers holding costs, shortens lead times, and enables continuous workflow monitoring. The Kaizen principle and real-time feedback foster a culture of continuous improvement, allowing employees at all levels to suggest and implement process innovations. This not only improves efficiency but also increases staff engagement and job satisfaction. Ghelani (2021) found that using Lean Six Sigma in a consumer electronics manufacturing plant resulted in a 15% reduction in production time and a 25% decrease in failure rates. Similarly, Siemens achieved a 40% decrease in unplanned downtimes by implementing predictive maintenance, with the initial investment in Internet of Things (IoT) technologies recouped in 18 months due to increased operational efficiency and waste reduction. Nestlé reduced waste by 18% during two

years, while Tesla cut inventory expenses by 22% after implementing Just-In-Time (JIT) processes and real-time data tracking systems. This study hypothesizes that:

H1: A positive relationship exists between lean supply chain practices and cost performance.

Methodology

Study approach and design

The study used a quantitative research design to guarantee the findings were objective, replicable, and generalizable (Creswell and Creswell, 2023). This was a deductive technique in which the researcher used statistical hypothesis testing to draw broad conclusions about the characteristics of lean supply chain strategies in Ghanaian SMEs (Azungah, 2018).

Study Setting and Population

The research population included staff, employees, and consumers from small and medium-sized firms (SMEs) in Greater Accra. This region was chosen because of its diverse geographical settings, large population, and ability to correctly represent the country's population while meeting the researcher's assessment criteria.

Sampling Design and Sample Size

Because of the enormous population seen during the pilot project's random sampling, simple random sampling was used in the study. The sample size was estimated using Yamane's formula. A sample size of 133 was determined from a target population of 200.

Data Collection Procedure

This study gathered information using self-administered questionnaires. Despite its low response rate, the key benefit of this strategy is that it reduces bias and allows you to reach a bigger audience. To address this, on-site questionnaires were administered, with preliminary testing using a standardized questionnaire. Although cross-sectional research has drawbacks, it was chosen because of its simplicity and the ability to include a large sample population in a single study.

Statistical Analysis

All analyses were carried out using IBM SPSS (version 26). The researcher employed descriptive (mean, standard deviation, skewness, kurtosis, t-value, variance) and inferential analysis to extract relevant information from the data collected and assess the study's assumptions. Descriptive statistics reveal the extent of each of the study's variables. The inferential analysis was utilized to evaluate the study's model.

Assessment of Reliability

Cronbach's alpha (1951) is broadly accepted as the best statistic for analyzing the internal consistency of variable measures, with larger values suggesting more reliability. In this work,

Cronbach's alpha reliability coefficients were assessed using a minimum threshold of 0.7 to quantify the overall reliability of the model's latent components. As a result, all variables display internal consistency, as their Alpha Values are greater than 0.70. The information acquired is thus credible. The dependability of each construct is shown in Table 1.

Table 1: Alpha Cronbach Test

Construct	Number of items	Alpha Cronbach
Lean supply chain	9	0.919
Cost Performance	7	0.926

Source: Field study (2021)

Ethical Considerations

To avoid coercion, the researcher explicitly defined the study's objectives and allowed participants to express concerns or withdraw at any moment. The researcher also preserved participants' personal information confidentiality while adhering to voluntary participation and informed consent norms. While collecting data, the researcher concentrated on demographic characteristics such as gender, age, and education level but did not request participants' identities because they were difficult to identify using descriptive categories. The researcher employed pseudonyms to protect participants from harm and informed them that the study's findings would be used solely for academic purposes, with no monetary incentive.

Results

Demographic Characteristics of Respondents

Table 2 shows that 54% of respondents are male and 43.6% are female. The age distribution of the responses indicates 32 under 29, 55 between 30 and 39, 42 between 40 and 49, and four over 50. This may indicate a younger supply chain workforce. Demographic data showed that 28.6% of respondents had 0–5 years of work experience, and 24.1% had 6–10 years. 33.8% had 11–15 years of experience, and 13.5% had more than 15 years. 57.9% of survey respondents had a first degree, while 42.1% had a second. 55 supervisors, 54 line managers, and 24 high managers answered the questionnaire.

Table 2 Demographic information of Respondents

Variables		Frequency	Valid Percentage
Gender of Respondents	Male	75	56.4%
	Female	58	43.6%
Age distribution of Respondents	29 and below	32	24.1%
	30 to 39	55	41.4%
	40 to 49	42	31.6%
	Above 50 years	4	3%
Educational level of Respondents	Secondary	1	0.8%
	Diploma/HND	15	11.3%
	1st degree	61	45.9%
	2nd degree or more	56	42.1
Work experience of Respondents	0-5 years	38	28.6%
	6-10 years	32	24.1%
	11-15 years	45	33.8%
	Above 15 years	18	13.5%
Managerial level	Supervisor	55	41.4%
	Line manager	54	40.6%
	Top-level	24	18%

Source: Fieldwork, 2021

Descriptives

Lean Supply Chain

Table 3 shows descriptive statistics for several lean supply chain practices. The mean scores vary from 4.76 to 5.40, showing a generally good attitude towards its implementation. The usage of standardized work processes received the highest rating (mean = 5.40), indicating widespread agreement on its usefulness. The adoption of Kyoryokukai received the lowest rating (mean = 4.76), indicating a lower emphasis on supplier associations. Standard deviations show moderate variety in answers, while kurtosis values imply that the data are approximately regularly distributed. Overall, respondents' average score of 5.11 indicates that lean practices are being implemented successfully.

Table 3 Descriptive Statistics – Lean Supply Chain

Variables	Min	Max	Mean	SD	Kurtosis
1. Pull system	1	7	4.84	1.192	0.869
2. Customer, supplier, and other essential parties have a close relationship.	1	7	5.14	1.205	0.709
3. Continuous and efficient replenishment	1	7	5.16	1.319	0.936
4. Value chain analysis (VCA) or Value stream mapping (VSM)	1	7	4.98	1.246	0.865
5. Kyoryokukai (suppliers' association that promotes lateral communication among suppliers and serves as an additional barrier against consumer opportunism)	1	7	4.76	1.304	0.547
6. Standardized work processes are used to ensure excellent results.	2	7	5.40	1.243	-0.04
7. Methodology for resolving problems that benefit both parties	1	7	5.23	1.295	0.725
8. Adoption of e-procurement and e-sourcing technologies	1	7	5.18	1.408	0.231
9. Two-way feedback assessment	2	7	5.29	1.324	-0.182
OVERALL SCORE	**1.67**	**7**	**5.1078**	**0.9988**	**1258**

Source: Fieldwork, 2021

Cost Performance

Table 4 demonstrates that respondents agreed on cost savings via lean techniques, with mean values ranging from 4.89 to 5.29. The highest-rated item was increased cost efficiency (mean = 5.29), while the lowest was lower waste treatment expenses (mean = 4.89). Standard deviations imply moderate variability, while kurtosis values indicate a normal distribution. The aggregate mean of 5.06 indicates a favourable opinion of lean approaches in improving cost performance.

Table 4 Descriptive Statistics – Cost Performance

Variables	Min	Max	mean	SD	Kurtosis
1. The cost of bought-in materials is reduced.	1	7	5.03	1.193	0.824
2. The cost of energy consumption is reduced.	1	7	4.97	1.342	0.407
3. The fee for waste treatment is being reduced.	1	7	4.89	1.374	0.126
4. The fee for waste disposal is being reduced.	1	7	4.97	1.331	-0.043
5. Fines for environmental accidents are being reduced.	1	7	5.06	1.248	0.357
6. Cost-effectiveness has improved	2	7	5.19	1.232	-0.158
7. Cost efficiency has improved	1	7	5.29	1.254	0.575
OVERALL SCORE	**1.71**	**7**	**5.0569**	**1.0659**	**0.611**

Source: Fieldwork, 2021

Exploratory Factor Analysis

Table 5 details the results of the validity tests. The table indicates that the nine (9) measures adopted to measure lean supply chains loaded above 0.50 are valid. Seven items were also developed to assess cost performance, loaded above 0.50 and valid.

Table 5 Exploratory Factor Analysis (EFA)

Items	LSC	CP
1. Pull system	0.721	
2. Customer, supplier, and other essential parties have a close relationship.	0.705	
3. Continuous and efficient replenishment	0.735	
4. Value chain analysis (VCA) or Value stream mapping (VSM)	0.711	
5. Kyoryokukai (suppliers' association that promotes lateral communication among suppliers and serves as an additional barrier against consumer opportunism)	0.707	
6. Standardized work processes are used to ensure excellent results.	0.661	
7. Methodology for resolving problems that benefit both parties	0.670	
8. Adoption of e-procurement and e-sourcing technologies	0.581	
9. Two-way feedback assessment	0.682	
10. The cost of bought-in materials is reduced.		0.775
11. The cost of energy consumption is reduced.		0.759
12. The fee for waste treatment is being reduced.		0.765
13. The fee for waste disposal is being reduced.		0.781
14. Fines for environmental accidents are being reduced.		0.708
15. Cost effectiveness has improved		0.765
16. Cost efficiency has improved		0.762

Notes: Lean Supply chain (LSC); Cost Performance (CP)

Source: Fieldwork, 2021

KMO and Bartlett's Test

Table 6 above shows the KMO test results. The KMO seeks to test the adequacy of the sample size adopted for the study. The one hundred and thirty-three sample size had a KMO value of .933, above 0.70. Hence, the sample size for the study was adequate. Also, Bartlett's test results were Approx. Chi-Square 2547.361; Df 276; Sig. .000. This indicates a substantial correlation in the data gathered.

Table 6 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.933
Bartlett's Test of Sphericity	Approx. Chi-Square	2547.361
	df	276
	Sig.	.000

Source: Fieldwork, 2021

Correlation Analysis

The relationship between lean supply chain and cost performance is assessed in this section. Correlation analysis reveals how changes in one variable impact changes in another variable. Table 7 provides a correlational analysis of the study. A strong positive relationship exists between lean thinking and cost performance (0.602, $p < 0.01$).

Table 7 Correlation Analysis and Descriptive Statistics

Construct	LSC	QT	CP	Mean	SD	Kurtosis
1 Lean Supply Chain	1	.715**	.602**	5.1078	0.9988	1258
2 Quality Thinking	.715**.	1	.649**	5.3665	1.0117	1.334
3 Cost Performance	.602**	.649**	1	5.0569	1.0659	0.611

Notes *p < .05, **p < .01; Lean Supply Chain (LSC); Cost Performance (CP)

Source: Fieldwork, 2021

Regression Analysis

The study's hypothesis was tested using Ordinary Least Regression and Moderated Hierarchical Regression in this section. Table 8, the model summary, reveals an R^2 of 0.433 and an adjusted R^2 of 0.429. This implies that the lean supply chain accounts for 43.3% of the variation in cost performance. Also, lean supply chain accounts for an additional 42.9% variation in cost performance. H1 stated a positive relationship between lean supply chain and cost performance. The regression results for H1 are provided below.

Table 8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.658[a]	.433	.429	.40509

a. Predictors: (Constant), Lean Supply Chain

Source: Fieldwork, 2021

The ANOVA results in Table 9 show that a lean supply chain could explain the variation in cost performance, given $p < 0.01$. Hence, it can be stated that the cost performance changes result from lean supply chain.

Table 9 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.449	1	16.449	100.238	.000
	Residual	21.497	131	0.164		
	Total	37.946	132			

a. Dependent Variable: Cost Performance

b. Predictors: (Constant), Lean Supply Chain

Source: Fieldwork, 2021

According to Table 10, for every unit of the lean supply chain, there is a 0.569 increase in cost performance given the path coefficient result: $\beta = .569$, $t = 10.012$, $p < .01$. There is significant support, therefore, for H1, which stated lean supply chain has a positive effect on an organization's cost performance.

Table 10 Coefficient of Variation

Model		Coefficients[a]				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.452	0.334		7.344	000
	Lean Supply	0.569	0.057	0.658	10.012	000

a. Dependent Variable: Cost Performance

Source: Fieldwork, 2021

Discussion

The findings of this study indicate a statistically significant positive relationship between lean supply chain practices and cost performance. The correlation study revealed a substantial relationship between the two dimensions, and regression analysis proved that lean methods had a meaningful impact on cost results. Based on these findings, Hypothesis 1 is accepted, confirming that implementing lean supply chain strategies improves enterprises' cost performance. Respondents rated standardized work processes, two-way feedback, and efficient replenishment techniques highly, indicating a substantial adoption of internal lean mechanisms. Similarly, cost performance metrics such as increased cost efficiency and lower material and disposal costs had high mean values, indicating positive financial results.

These findings are consistent with previous empirical research linking lean approaches to cost reductions and operational improvements across industries. Previous studies have shown that lean techniques like JIT, Kaizen, and real-time data tracking minimize waste, shorten production cycles, and lower overhead costs (Benah *et al.*, 2020; Buabeng, 2023; Manzoor *et al*., 2021). Similar to the current findings, studies have demonstrated that when lean is efficiently implemented, organizations benefit from improved coordination, fewer disruptions, and lower inventory holding costs (Okpala *et al*., 2024; Burawat, 2024). Furthermore, Taher and Al Bashar (2024) discovered that when integrated into lean systems, real-time monitoring systems improve cost reduction outcomes by allowing for faster workflow adjustments. The favourable cost effects reported by enterprises in this study significantly support these findings, confirming lean's efficacy as a cost management tool.

Despite these benefits, the results show inequalities in implementation depth. While internal-focused techniques such as standardization and feedback systems were extensively embraced, externally orientated-tactics such as Kyoryokukai, which focuses on supplier collaboration, received less attention. This shows a partial use of lean principles, focusing on internal operational efficiency rather than overall supply chain optimization. According to Khorasani, Cross, and Maghazei (2020), lean systems work best when integrated adequately with internal and external coordinating mechanisms. The lesser adoption of relational tools in this study alludes to contextual constraints, such as poor supplier networks or low inter-firm trust, that may impede the full implementation of lean concepts in the local setting.

According to the Resource-Based View (RBV), these findings show that lean supply chain strategies are necessary internal capabilities that provide a competitive advantage. Standardized workflows, JIT delivery systems, and structured feedback loops reflect entrenched routines that are unique to the company and difficult for competitors to reproduce. These capabilities improve cost efficiency while strengthening the company's strategic position. However, RBV highlights the need to harness complementary resources, such as supplier connections and knowledge-sharing networks, which appear to be underutilized in this setting. According to Kemunto and Anthony

(2024), companies that combine internal process excellence with external collaborations are more likely to maintain a long-term competitive edge. While lean approaches have improved performance, the underdeveloped external dimension limits their full strategic potential.

The findings demonstrate that lean supply chain strategies improve cost performance, consistent with broader empirical evidence across sectors and contexts. However, the inconsistent implementation of strong internal practices and weak collaborative elements indicates that organizations have yet to reap the systemic benefits of lean completely. To increase the strategic value of lean supply chains, companies must go beyond efficiency gains and develop relationship capabilities. This improves immediate cost performance and embeds long-term competitiveness following RBV assumptions.

Conclusion

This study investigated the impact of lean supply chain methods on cost performance and discovered a substantial positive correlation between the two constructs. Acceptance of the hypothesis confirms that organizations that use lean methods more extensively are likely to have better cost outcomes. The findings indicate that internal lean capabilities, such as standardized work, feedback mechanisms, and responsive procurement, are essential in eliminating operational waste and increasing cost efficiency.

While these findings are consistent with a large body of empirical evidence and support the Resource-Based View (RBV), the study also identifies significant shortcomings in present practice. The relatively low emphasis on externally focused lean methods, such as supplier associations, indicates a limited application of lean thinking that prioritizes internal operations over broader supply chain integration. This represents a missed chance to fully capitalize on the strategic potential of lean as a system-wide approach to performance improvement.

Theoretically, the study expands on RBV by demonstrating how, when effectively internalized, lean techniques can function as firm-specific skills that provide a competitive advantage. Practically, it emphasizes the need for businesses, particularly those in emerging nations, to move beyond discrete, lean technologies and adopt more integrated, collaborative supply chain methods. Future research should look at the enablers and restraints of such widespread adoption, focusing on context-specific hurdles that influence the lean transformation process.

Recommendations

Based on the outcomes of this research, some recommendations are presented to enrich the adoption and effectiveness of lean supply chain practices among SMEs in Ghana:

Firstly, customized training programs should be developed to equip SME managers and employees with practical knowledge of lean tools such as Kaizen, Just-in-Time (JIT), and Value Stream Mapping (VSM). Further collaboration with universities, business associations, and government

agencies can provide certification courses and continuous professional development in lean supply chain management.

Second, SMEs should extend lean practices beyond internal operations by fostering stronger supplier associations and collaborative procurement mechanisms. Building trust-based relationships with suppliers will improve responsiveness, reduce opportunism, and enhance overall supply chain efficiency.

Lastly, SMEs should embrace digital solutions such as e-procurement platforms, e-sourcing technologies, and real-time data monitoring systems. These tools can streamline purchasing, optimize inventory control, and enable faster workflow adjustments, thereby reducing operational costs.

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