

ENHANCING SME BUSINESS SUSTAINABILITY THROUGH EFFICIENT SUPPLY CHAIN MANAGEMENT: A FOCUS ON SUSTAINABLE PRACTICES IN EMERGING MARKETS

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ABSTRACT

Despite the increasing rate of digital technologies in transforming supply chain activities in the dynamic business environment today, small and medium-sized enterprises (SMEs) in emerging markets remain behind the expected standard in using digital technologies, a factor that negatively affects their sustainability and efficiency in their supply chain management practices. This technological disparity is a major threat to the long-term business sustainability and competitiveness of SMEs, especially with the changing market requirements and the growing sustainability pressures. Therefore, this study examined the influence of efficient supply chain management, sustainable supply chain practices, and digital technologies on the sustainability and operational efficiency of small and medium-sized enterprises (SMEs) in emerging markets. A cross-sectional survey design was adopted, using quantitative approaches. Data were collected from 340 SME owners and managers in Lagos State (Southwest) and Kwara State (North-Central), Nigeria, using purposive sampling technique. The data were analyzed using descriptive statistics and Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings revealed that supply chain management practices inventory management, supplier collaboration, and logistic efficiency significantly influence SME business sustainability, explaining 59.3% of its variance ($R^2 = 0.593$). Among these, inventory management has the strongest effect ($\beta = 0.594$), followed by supplier collaboration ($\beta = 0.204$) and logistic efficiency ($\beta = 0.112$). Sustainable supply chain practices environmental initiatives, green procurement, and waste management explain 91.2% of the variance in operational efficiency ($R^2 = 0.912$), with green procurement ($\beta = 0.442$) and environmental initiatives ($\beta = 0.414$) showing strong positive effects, while waste reduction is not significant. Digital technologies and innovations IoT, artificial intelligence (AI), and innovation explain 78.8% of the variance in sustainable supply chain management implementation ($R^2 = 0.788$). The study concluded that integrating efficient supply chain practices, sustainable initiatives, and digital technologies significantly enhances SME sustainability and operational performance in emerging markets. It recommends investment in inventory systems, strengthening supplier collaboration, adoption of green procurement, and leveraging IoT and AI to optimize supply chain operations.

Keywords: Supply chain management, sustainable supply chain practices, SMEs, digital technologies, business sustainability, operational efficiency.

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1.0 Introduction

The SMEs in the emerging markets contribute significantly to the economic growth and the creation of employment opportunities (Agyemang et al., 2022). Nevertheless, these enterprises are frequently subject to serious limitations, such as lack of capital, insufficient infrastructure, and regulatory deficits (Amoako & Lyon, 2022). The limitations render the implementation of sustainable practices more difficult and increasingly needed. The sustainable supply chain orientation in the emerging markets is not only an opportunity to enhance the resilience of SMEs but also a means of enabling a channel to contribute to the global sustainability agenda, e.g., the United Nations Sustainable Development Goals (SDGs), specifically Goal 12, which requires the consumption and production of goods to be sustainable (United Nations, 2015).

Even though there is increased awareness of the relevance of sustainability in the supply chain, there are still several challenges facing the strategies, particularly in emerging markets. The financial limitations experienced by most SMEs pose a challenge in making investments in the required infrastructure or technologies to embrace sustainable SCM practices (Yawar & Seuring, 2021). Also, the absence of awareness and understanding of the long-term advantages of sustainability can lead to the short-term cost-oriented decisions that negatively affect the possibility of the long-term beneficial impact (Li et al., 2022). These challenges should be tackled by both the government and the business community, and a change in attitude toward sustainability as a business success factor, rather than an additional burden (Jabbour et al., 2019).

SMEs are the key stakeholders in growth and economic development, and in most emergent economies, these entities typically play a significant role in job creation and reduction of poverty (Agyemang et al., 2022). Nonetheless, resource inefficiencies, bad infrastructure, and environmental degradations have continued to have negative impacts on the going concern principle of such enterprises. The global sustainability agenda is not the area where SMEs can synchronize their operations, and most of them in many emerging economies are unable to do so mainly because of the financial constraint, technical know-how, and insufficient regulatory assistance (Yawar & Seuring, 2021). Supply chain management (SCM) is a very important aspect in overcoming these challenges, as it helps the businesses to channel the resources in a better way, reduce the harmful effects on the environment, and increase the efficiency of the operations. However, these emerging market SMEs do not implement sustainable SCM practices because of a wide range of barriers, including the lack of access to sophisticated technologies, deficient supplier cooperation, and unawareness about the long-term advantages of sustainability (Pereira et al., 2022; Li et al., 2022).

However, the research covered the urgent gap concerning the necessity to investigate how SMEs operating in the emerging markets are able to overcome the challenges and contribute to the sustainability of their businesses by means of effective supply chain management. The research, hence, concentrate on sustainable practices implementation with an aim of offering practical recommendations to SMEs in enhancing resilience, competitive edge, and congruence with sustainability programs across the world. The research questions that are relevant to this study are as follows:

1. How does efficient supply chain management enhance the business sustainability of SMEs in emerging markets?
2. What sustainable supply chain practices can SMEs implement to improve operational efficiency and competitiveness?
3. How can digital technologies and innovations support sustainable supply chain management for SMEs in emerging?

2.0 Literature Review

2.1 Supply Chain Management Practices

One of the strategic elements that companies are using as a means of successfully managing the movement of materials, information, and products between the suppliers and ultimate consumers is the

supply chain management practices (SCMP). The normal practices are strategic supplier alliances, sharing of information, customer relations management and effective inventory control. Supply chain management practice can help the firms to become more efficient in the context of the operations, minimize costs, increase quality of goods, and react to market forces in a timely manner. (Lelo, 2024). Organizations, especially the small and medium-sized enterprises (SMEs) have been implementing innovative and sustainable supply chain practices in the past few years as one of the methods of ensuring that the competitiveness of such organizations becomes stronger and performance sustainable in the long run. During the study, it was mentioned that organizational members that adopt effective supply chain management activities are more likely to achieve better performance, customer satisfaction, and competitive advantage in volatile business environments (Kumar et al., 2023; Lelo, 2024).

2.2 Innovation Support.

The issue of innovation support has been persistently coming out as a key enabler to SMEs that are aiming at realizing supply chain sustainability, especially in the emerging markets that have resource limitations, poor institutional structures, and inadequate infrastructure. According to the recent literature, sustainability in the development of supply chains has grown at a faster rate as there is a growing focus in the world to deal with the issues of poverty, climate change, and inclusive economic development. Digital platforms, blockchain, and artificial intelligence are some of the technological innovations that are becoming increasingly used to promote transparency, traceability, and efficiency in the SME supply chain, leading to sustainable development results (Kumar et al., 2023; Dubey et al., 2021).

Another dimension of the innovation support is the establishment of knowledge-sharing cultures and networks. Social capital and trust in supply chain participants have been observed to enhance information flow, decrease uncertainty, and enhance adaptive capacity in turbulent markets (Zhang et al., 2022; Singh & Dhir, 2022).

The open innovation models have also received significant academic interest as strategic tools of promoting the sustainability of SMEs. Open innovation will enable the SMEs to tap into external knowledge, technologies, and resources by undertaking partnerships with universities, research institutions, startups, and even competitors. The process will minimize innovation cost, increase speed to market, and improve sustainability-related competencies. Recent research also suggests that open innovation ecosystems on the basis of digital platforms and policy frameworks can be instrumental in developing inclusive and sustainable supply chains in emerging economies (Chesbrough & Bogers, 2022; Viale et al., 2022). In general, the combination of support systems of innovation such as knowledge sharing, digitalization, open innovation, and institutional support constitutes a multidimensional framework that allows SMEs in the emerging markets to address structural issues and attain sustainable performance of supply chains.

2.3 Digital Technologies.

The use of digital technologies is now a crucial force of supply chain transformation that provides SMEs with additional resources to enhance operational efficiency, visibility, and sustainability. In particular, the IoT allows monitoring the goods and resources in real time by enhancing visibility and traceability in supply chains (Ben-Daya, et al, 2019), AI technologies optimise the work of supply chains, anticipate breakdowns, and allow a proactive response to a possible challenge (Culot, et al, (2024), and blockchain technology enhances trust and accountability by creating unchangeable records

Based on these functionalities, the application of AI, blockchain, and IoT to supply chain management has a huge potential to increase supply chain performance due to improved demand forecasting, supply chain system and real-time decision-making, which altogether creates a promising direction towards more resilient and sustainable management (Kamble, et al, 2023). Nevertheless, there are no obstacles to the implementation of digital technologies in SMEs, and the first cost of implementation has been discovered to be a barrier, especially in small and medium-sized enterprises, which makes the introduction of AI and blockchain in the supply chain business significantly challenging (Khan et al.,

2024). Despite these obstacles, blockchain promotes data security, transparency and smooth cooperation of resources, which helps firms pursue their sustainability objectives (Kamble et al., 2023).

2.4 Business Sustainability

The recent literature highlights that the concept of SME sustainability has moved beyond profit maximization and includes business expansion, environmental, social, and governance (ESG) practices that make the business more resilient and competitive in the long term. A meta-analytic review demonstrates that social and environmental sustainability enhance the competitiveness of SMEs much more than financial ones like reputation and stakeholder trust, and contextual elements such as economic development and culture mediate such associations (Oduro & Haylemariam, 2025). Saman et al. (2025) emphasize the role of digital technologies and green innovation integration in achieving the sustainability performance of SMEs, but the effective implementation of these technologies is often hindered by organizational and strategic barriers, the study indicates that technology and sustainable business models should be aligned to promote resilience and long-term prosperity.

2.5 Operational efficiency

Operational efficiency in SMEs is a key performance enhancer, cost-saving factor, and long-term sustainability, especially in dynamic and resource-limited environments. The findings indicated that lean management practices, optimization of processes, and digital technologies considerably improve the efficiency of SMEs, minimizing waste, increasing productivity, and shortening the decision-making process (Nguyen et al., 2024). Abubakar and Olanrewaju (2025) note that, effective resource use, employee ability, and innovation in the processes are important factors that enhance operation efficiency, particularly in emerging economies, where companies should constantly respond to competitive forces and infrastructural issues; their results show that operationally efficiency is been influenced by firms' resilience.

3.0 Theoretical Review

3.1 Supply Chain Sustainability Theory (SCST).

This study is anchored on Supply Chain Sustainability Theory (SCST) propounded by Seuring and Muller (2008) which offers a holistic theory on the relationship of effective supply chain management in augmenting the sustainability of SMEs, especially in the emerging markets such as Nigeria. The SCST incorporates the environmental, social, and economic aspects which are usually known as the triple bottom line into the supply chain operations hence it provides a holistic approach to long-term sustainability without compromising the efficiency of operations. The theory highlights that sustainable supply chains are not just a tool to meet environmental requirements but rather a strategic process that enhances efficiency and value creation to the stakeholders such as customers, staff and communities. This is in line with the fact that the study is focused on business sustainability and operational efficiency and thus allows systematic analysis on how Nigerian SMEs can exploit supply chain practices to be competitive and sustainable.

In addition, SCST emphasizes the role of collaboration between supply chain actors in suppliers, manufacturers and distributors in attaining the sustainability objective, which is especially applicable in Nigeria where SMEs are usually limited by lack of resources and infrastructural difficulties. Through coordinated supply chain networks, SMEs are able to share resources, knowledge and sustainability standards thus enhancing efficiency and performance. Other essential sustainable practices that have been observed in the theory to play a major role in determining the sustainability results are waste reduction, green procurement, ethical labor, and cost-effective resource management. Although it has been recognized that there are barriers to it such as limited financial capacity, technical knowledge, and the lack of regulatory support, SCST offers an explanatory and prescriptive framework. It assists in explaining why certain SMEs have better performance in sustainability and efficiency and also directs policy and managerial interventions towards better adoption of sustainable supply chain practices.

4.0 Empirical Review and Hypothesis Development

4.1 SME Sustainability and Efficient Supply Chain Management.

Ajayi et al., (2021). investigated the implications of green supply chain management practices that involve green distribution and green procurement on the operational and environmental performance of SMEs in Oyo State, Nigeria. The researchers adopted the survey research design and collected the data of 455 SME operators who were sampled through the stratified random sampling. The correlation and regression analyses were conducted in order to test the relationship between the supply chain practices and the SME performance. The findings showed that green distribution is useful in improving the environmental performance and green procurement is useful in improving the operational performance of the SMEs. The study investigated the hypothesis that the effective practices in supply chain management can lead to the effectiveness and sustainability of the organizations among the SMEs. This paper has found that the sustainability of SMEs directly depends on effective supply chain management that is sustainable, particularly in developing markets.

Akhtar and Zafar (2021) explored the issue of the enhancement of sustainability in emerging market SMEs by SCM. They gather cross-sectional information of SMEs in various industries. In the study, the hypothesis is that SMEs in emerging economies are unable to participate or practice sustainable supply chain management because of the limitation of resources, technology, and logistics. The research suggests a proactive SCM orientation in the new markets where SMEs utilize the local resources and collaborate with the suppliers to adopt green technologies. In addition, Maleki and Zarif (2018) survey SMEs in the emerging markets of India and Nigeria to obtain quantitative data and examine how Sustainable Supply Chain Management (SSCM) influences the competitiveness of SMEs in the emerging markets. The research, however, demonstrates the possibility of improving profitability through the sustainability of the supply chain, yet the awareness of SMEs, their technical capabilities, and capital investments constitute challenges. It concludes that to maximize the benefit of sustainable supply chains, the SMEs require external assistance such as government policies, training, and collaborative networks.

Gupta and Kumar (2019) employed a mixed-method to discuss the role of GSCM as a means of assisting SMEs in the emerging markets to become sustainable and gain a competitive edge. They question the SME managers regarding GSCM and they conduct surveys to assess the consequences of green practices on operational performance. The study explores the eco-design of supply chains, sustainable sourcing, and waste minimization. They say that such benefits can be given through long-term cost cuts, brand image and consumer loyalty as well. The implications are key to the growth and sustainability of SMEs in highly competitive and resource-constrained circumstances. Gupta and Kumar assert that SMEs find it difficult to adopt GSCM because of the high initial costs, untrained personnel, and limited funds. The SMEs need to consider incremental changes, working together with green suppliers, and the local community in the creation of shared value and supply chain sustainability. The authors recommend that government incentives and international cooperation can help SMEs to overcome GSCM adoption issues. This hypothesis is developed on the basis of these findings and following the objective of this study in the context of Nigeria situation.

H_{01} : Efficient supply chain management has no significant effect on the business sustainability of SMEs in emerging markets.

4.2 Sustainable Supply Chain Practices and SME Performance

Abuzawida et al. (2023) used an empirical study to examine how sustainable supply chain practices impact organizational economic performance among manufacturing companies. A cross-sectional survey was employed in the study, and 439 valid responses were obtained among manufacturing organizations. The correlation between sustainable supply chain practices and environmental performance, social performance, and economic performance was subsequently analyzed using structural equation modelling. The results showed that sustainable supply chain practices have a positive effect on environmental and social performance, which subsequently enhances economic performance.

The research also discovered that sustainable supply chain practices, especially the adoption of advanced technologies, including Industry 4.0 tools, reinforce the positive impact of sustainable supply chain practices on organizational performance. The authors found that incorporating sustainability in the supply chain operations improves the efficiency of its operations and competitiveness in the long term.

Turkesh et al. (2024) examined how sustainable supply chain practices affect the performance of enterprises in Romania. The research adopted a survey research design and sampled 385 firms, including SMEs, to fill in structured questionnaires distributed to managers of the supply chains. The researchers used Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the links between the supply chain sustainability practices and performance in firms. The findings revealed that sustainable supply chain practices and business performance are positively and significantly associated. In particular, the practices of economic, environmental, and social sustainability in the supply chains were discovered to enhance the operational and financial results. The research established that organizations practicing sustainable supply chain strategies have the ability to improve performance and long-term competitiveness.

H₀₂: Sustainable supply chain practices do not significantly improve operational efficiency among SMEs.

4.3 Digital Technologies and Sustainable Supply Chain Management

Bag, Gupta and Kumar (2021) investigated how Industry 4.0 technologies impact the sustainable performance of the supply chains in manufacturing companies. The quantitative research design was adopted by the researchers, with the participants being 206 supply chain professionals in manufacturing companies. The hypothesized relationships were tested using structural equation modeling (SEM). The results showed that Industry 4.0 technologies impact sustainable supply chain performance significantly (0.41, $p < 0.01$). The findings suggest that IoT, big data analytics, and automated digital technologies improve the effectiveness of operations and environmental sustainability. The research found that the implementation of digital technologies enhances the sustainable management of supply chains and enhances the performance of firms.

Dubey et al. (2023) conducted an empirical study to determine how artificial intelligence and digital supply chain technologies influence sustainable supply chain performance in the emerging economies. The authors surveyed 321 supply chain managers and modeled the results with the help of the Partial Least Squares Structural Equation Modeling (PLS-SEM).

It was found that the implementation of artificial intelligence and digital supply chain technologies can substantially improve the performance of a sustainable supply chain ($r = 0.47$, $p < 0.001$). The findings showed that digital innovations assist companies in enhancing the optimization of logistics, use of resources, and sustainability of the environment. The research found that digital technologies play a pivotal role in ensuring sustainable supply chain management.

H₀₃: Digital technologies and innovations have no significant impact on the implementation of sustainable supply chain management in SMEs.

5.0 Methodology

A cross-sectional research design was adopted in the study, as it was the descriptive survey research design, which was applicable when the researcher needed to investigate the relationship between supply chain management practices, innovation, digital technologies, and SME performance at a point in time. The research involved quantitative methods where numerical data was gathered using respondents, and thus statistical tests of the hypothesized relationships were analysed.

The study population was composed of managers and owners of small and medium-sized enterprises (SMEs) and registered SMEs in the regions of Lagos State (Southwest) and Kwara State (North-Central) of Nigeria. The choice of these states is due to the fact that Lagos is the commercial center of the Southwest, whereas Kwara is a representative of the North-Central region with the growing SME

activity. Registered SMEs that were operating with formal structures were only selected to assure that respondents possessed sufficient knowledge on supply chain operation and sustainability practices.

A purposive sampling method was used in the study to select SME managers and owners that were directly engaged in the supply chain activities. Purposive sampling was used to ensure that the respondents were able to give pertinent and correct information towards the research objectives. The population and sample size of the two states were approximated as follows:

Table 1: Population and Sample size of the Study

State	SME Sector	Population (Estimated)	Sample Size
Lagos (SW)	Manufacturing	800	80
	Retail and Wholesale Trade	700	70
	Services (IT, Logistics, etc.)	600	60
	Construction & Real Estate	400	40
Subtotal		2500	250
Kwara (NC)	Manufacturing	300	30
	Retail and Wholesale Trade	250	25
	Services (IT, Logistics, etc.)	200	20
	Construction & Real Estate	150	15
Subtotal		900	90
Total		3400	340

Source: SMEDAN, 2025

Primary data was collected using structured questionnaires and included SME managers and owners. Data on supply chain management practices, sustainable supply chain practices, digital technology adoption, and SME performance were collected using the questionnaire. The sample size (340) was about 10 percent of the estimated population, which was enough to yield enough statistical power to analyze it quantitatively. This approach is aligned with the common survey research approach where researchers expand the sample by 20 percent or 30 percent of the already calculated sample to acquire sufficient data to draw strong statistical conclusions (Hulley et al., 2013). The 20% of the 340 is 68, as the sample size is 408. This implies that contact of 408 respondents was made.

The research objectives and measurements in the study were assessed through structured questionnaires with a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to identify the perceptions of respondents as they relate to supply chain management (supplier collaboration, inventory management, and logistics efficiency) based on Bag et al. (2021) and Lelo (2024). Sustainable supply chain practices (environmental initiatives, green procurement, and waste management) and SME performance were also measured through operational efficiency modified after Kumar et al. (2023) and Abuzawida et al. (2023).

Sustainable Supply Chain Management (innovation, adoption of artificial intelligence, Internet of Things (IoT), and sustainability of supply chains), modified after Dubey et al. (2023), Pereira et al., (2022), and Bag et al. (2021). The Likert scale enabled the quantitative analysis of subjective answers in a uniform manner and all the instruments had undergone pretesting of validity and reliability. The analysis of responses was then done with PLS-SEM to give structural relationships.

Data obtained were analyzed with the help of descriptive and inferential statistics to test the hypothesized relationships. The study involved a basic frequency table and a Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS.

6.0 Results and Discussion

The questionnaire was distributed among the respondents in 408 copies in the process of data collection. Nevertheless, only 340 copies turned out to be filled in correctly and analyzeable after retrieval and screening. The rest of the questionnaires were not included because of other factors like the care of unfinished responses and discrepancies in information given. The final sample utilized in the analysis of this study was therefore the 340 valid questionnaires.

Table 2: Demographic Characteristics of Respondents

Items		Frequency	Percentage (%)
Gender	Male	216	63.5%
	Female	124	36.5%
	Total	340	100.0
Age	Below 20 years	52	15.3%
	21-30 years	83	24.4%
	31 – 40 years	152	44.7%
	41 years above	53	15.6%
	Total	340	100.0
Educational Qualification	SSCE	95	27.9%
	ND/NCE	98	28.8%
	HND/BA/B,SC	97	28.5%
	MSC/MBA	50	14.7%
	Total	340	100.0
Years of Business Experience	Below 5 years	87	25.6
	6-10 years	103	30.3
	11-15 years	52	15.3
	16-20 years	69	20.3
	More than 20 years	29	8.5
	Total	340	100.0

Source: Researchers' computation (2026)

The demographic data presented in the Table 2 provides important background information about the respondents involved in the study on enhancing SME business sustainability through efficient supply chain management and sustainable practices in emerging markets. The variables considered include gender, age, educational qualification, and years of business experience. These characteristics are important because they help to determine the capability, experience, and educational background of the respondents, which in turn affects the reliability of the information provided in the study. The gender distribution shows that the majority of the respondents were male, accounting for 216 respondents or 63.5%, while female respondents accounted for 124 respondents or 36.5%. This indicates that male entrepreneurs dominate the SME sector in the study area. However, the proportion of female respondents is also significant, suggesting that women are increasingly participating in SME operations and contributing to supply chain activities and business sustainability in emerging markets.

The age distribution of the respondents shows that 15.3% were below 20 years, 24.4% were between 21 and 30 years, 44.7% were between 31 and 40 years, and 15.6% were 41 years and above. The results indicate that the majority of the respondents fall within the age range of 31–40 years. This age group is considered the most economically active and productive age group, and individuals within this range are more likely to be actively involved in business decision-making, innovation, and the adoption of sustainable supply chain practices. This suggests that the respondents are mature enough to have practical business knowledge and experience relevant to the study. In terms of educational qualification, the table shows that 27.9% of the respondents had SSCE, 28.8% had ND/NCE, 28.5% had HND/B.A/B.Sc., while 14.7% had MSc/MBA degrees. This indicates that the respondents are educated, with the majority possessing post-secondary education. The relatively high level of education among respondents implies that they have the ability to understand and implement efficient supply chain management strategies and sustainable business practices. Education plays an important role in the adoption of modern business techniques, innovation, and sustainability practices in SMEs.

The distribution of respondents by years of business experience shows that 25.6% had less than 5 years of experience, 30.3% had 6–10 years of experience, 15.3% had 11–15 years of experience, 20.3% had 16–20 years of experience, and 8.5% had more than 20 years of experience. This indicates that most respondents had between 6 and 10 years of business experience. This level of experience suggests that the respondents have spent a considerable amount of time in business and are familiar with supply chain operations, business sustainability challenges, and sustainable practices. 1, the demographic characteristics of the respondents show that the study participants are predominantly male, within the active working age, educated, and have moderate business experience. These characteristics suggest

that the respondents are knowledgeable and experienced enough to provide reliable information on efficient supply chain management and sustainable practices, thereby enhancing the validity and reliability of the study findings

Table 3: Descriptive Statistics of All Constructs and Indicators

Item	Indicator Description	Mean	Std. Dev.
Supplier Collaboration (SUCO)			
SUCO1	SMEs maintain strong supplier relationships	3.829	1.258
SUCO2	Suppliers are engaged in sustainability initiatives	4.138	1.015
SUCO3	Collaborative planning improves supply chain outcomes	4.062	1.046
Inventory Management (INMT)			
INMT1	Effective inventory reduces stockouts and overstock	3.947	1.121
INMT2	Real-time tracking improves inventory accuracy	3.703	1.351
INMT3	Inventory systems support demand forecasting	3.971	1.129
Logistic Efficiency (LOEF)			
LOEF1	Delivery timelines are consistently met	4.159	0.945
LOEF2	Logistics costs are optimised effectively	4.141	0.925
LOEF3	Routing and distribution networks are efficient	3.791	1.13
Environmental Sustainability (ENIN)			
ENIN1	SMEs adopt eco-friendly production methods	3.885	1.194
ENIN2	Carbon emission reduction is a strategic priority	4.103	0.807
ENIN3	Environmental compliance is actively monitored	3.888	0.991
Green Procurement (GRPR)			
GRPR1	Green criteria guide supplier selection	3.703	1.233
GRPR2	Sustainable materials are preferred in purchasing	3.797	1.224
GRPR3	Procurement policies promote eco-responsible sourcing	3.997	0.95
Waste Management (WAMA)			
WAMA1	Waste reduction strategies are implemented	3.926	1.056
WAMA2	Recycling and reuse practices are in place	3.885	1.015
WAMA3	Waste disposal complies with environmental standards	3.924	1.06
Innovation (INNO)			
INNO1	SMEs invest in new technologies and processes	3.971	1.129
INNO2	Innovation drives competitive advantage	4.215	0.825
INNO3	New product development is actively encouraged	4.141	0.925
Artificial Intelligence Adoption (ARIA)			
ARIA1	AI tools are used to enhance decision-making	3.962	0.974
ARIA2	AI improves operational forecasting accuracy	3.868	1.175
ARIA3	AI adoption supports process automation	3.915	1.058
Internet of Things (INOT)			
INOT1	IoT devices monitor supply chain activities	3.856	1.098
INOT2	IoT integration improves data collection efficiency	3.982	0.945
INOT3	IoT enables real-time tracking and monitoring	4.153	0.904

Business Sustainability of SMEs (BUSU)			
BUSU1	SMEs integrate sustainable practices into operations	4.059	0.968
BUSU2	SMEs achieve long-term profitability sustainably	4.041	0.926
BUSU3	SMEs demonstrate resilience in competitive markets	3.95	0.933
Operation Efficiency of SMEs (OPEF)			
OPEF1	Operations are streamlined to reduce waste	3.885	1.015
OPEF2	Process efficiency improves overall output quality	3.847	1.122
OPEF3	SMEs continuously improve operational processes	4.135	0.811
Sustainable Supply Chain Management (SSCM)			
SSCM1	Supply chain decisions consider environmental impact	4.153	0.904
SSCM2	Sustainability criteria are integrated into procurement	4.135	0.951
SSCM3	SCM practices support long-term business goals	4.035	1.057

Source: Researchers' computation (2026)

Table 2 indicates the descriptive statistics of each construct and the indicators of the same that were employed in the study. The table displays the mean and the standard deviation of each item that is used to measure collaboration with suppliers, inventory management, logistics efficiency, environmental initiatives, green procurement, waste management, innovation, adoption of artificial intelligence, Internet of Things, business sustainability, operational efficiency, and sustainable supply chain management among SMEs. Mean scores of all the indicators will be between 3.703 and 4.215, this means that the respondents tended to agree with the statements describing the different constructs. This is an indication that the SMEs in the research region are actively implementing the strategies of supply chain management and sustainable business management. The values of standard deviation are largely within the range of 0.8 to 1.3, and this implies that the amount of variation in responses is moderate, implying that the opinions of the respondents are fairly congruent.

To collaborate with suppliers, the mean values show that SMEs have well established relations with their suppliers, engage them in their sustainability, and collaborate in planning to enhance the supply chain. This also means that, supplier collaboration is a significant aspect of sustainable supply chain management between SMEs. Under inventory management, descriptive statistics indicate that SMEs have good inventory management systems that can be used in minimizing stockouts and overstock situations. These findings also show that real-time tracking systems and inventory management systems facilitate demand forecasting but the difference in the responses indicate that not all SMEs have extensively adopted the advanced inventory tracking technologies. Mean values of the logistics efficiency indicators are relatively high which means that SMEs can meet the delivery schedules, optimize the costs of logistics, and have effective routing and distribution systems. This implies that effective logistics management can be a major source of business sustainability and efficiency in operation.

The construction of the environmental initiatives demonstrates that the SMEs use environmentally friendly manufacturing techniques, are interested in minimizing carbon emissions, and actively control the environment. This is a pointer of the fact that there is a steady incorporation of environmental sustainability practices into the operations of the SMEs. Green procurement practice is also observed, the findings indicate that SMEs apply green criteria in the selection of suppliers, sustainable materials, and that they apply procurement policy which encourages the use of environmentally responsible sourcing. This implies that the procurement practices contribute to the realization of sustainable supply chain management. SMEs are also involved in waste management practices, which are indicated by waste reduction strategies, recycling and reuse practices as well as proper waste disposal as required by the environmental standards. This implies that the SMEs are striving to reduce environmental effects by having proper waste management techniques. The innovation construct presents high mean values especially in the section of innovation that brings competitive advantage. This shows that SMEs embrace new technologies and processes, and they also promote new product development as a

competitive and survival strategy.

The uptake of artificial intelligence by SMEs can be monitored by the implementation of AI-based decision-making, prediction, and automation of processes. Though the average values are quite high, the difference in answers indicates that some SMEs are still at the stage of introducing AI adoption. Likewise, SMEs are using the Internet of Things to track supply chain operations and enhance data collection efficiency as well as real-time tracking and monitoring. This shows that the digital technologies are gaining more significance in supply chain management and operational efficiency. Business sustainability construct indicates that SMEs incorporate sustainable practices in their activities, attain long-term profitability and exhibit a competitive resilience in the competitive markets. This implies that sustainability practices bring about the survival and growth of SMEs in the long term.

Indicators of operational efficiency demonstrate that the SMEs are simplifying their operations to minimize wastages and enhance the quality of their output besides making a continuous improvement of the operational processes. This shows that one of the major results of effective supply chain management and innovation is operational efficiency. Lastly, the sustainable supply chain management construct demonstrates that SMEs take into account the impact on the environment in their supply chain decision-making, apply sustainability principles to procurement, and make sure that the management practices within the supply chain contribute to achieving the long-term business objectives. This is an indication that, sustainable supply chain management is also an important aspect in improving efficiency of operation and business sustainability among SMEs. According to the descriptive statistics, SMEs actively implement sustainable supply chain management practices, innovation, and digital technologies, which help them to become more efficient in their operations and guarantee the business sustainability in the new markets.

Table 4: Measurement Model Results (Reliability and Validity)

Construct	Item	Loading	Cronbach's α	CR	AVE	HTMT
BUSU	BUSU1	0.873	0.801	0.883	0.716	0.62
	BUSU2	0.882				
	BUSU3	0.801				
INMT	INMT1	0.781	0.776	0.869	0.688	0.71
	INMT2	0.803				
	INMT3	0.861				
LOEF	LOEF1	0.721	0.744	0.854	0.662	0.58
	LOEF2	0.892				
	LOEF3	0.754				
SUCO	SUCO1	0.836	0.752	0.857	0.667	0.64
	SUCO2	0.778				
	SUCO3	0.812				
ENIN	ENIN1	0.741	0.728	0.844	0.644	0.59
	ENIN2	0.838				
	ENIN3	0.801				
GRPR	GRPR1	0.807	0.789	0.876	0.702	0.68
	GRPR2	0.843				
	GRPR3	0.821				
OPEF	OPEF1	0.908	0.812	0.889	0.728	0.55
	OPEF2	0.892				
	OPEF3	0.774				
WAMA	WAMA1	0.712	0.751	0.857	0.667	0.57
	WAMA2	0.902				
	WAMA3	0.842				
ARIA	ARIA1	0.720	0.733	0.846	0.648	0.63

	ARIA2	0.754				
	ARIA3	0.829				
INNO	INNO1	0.771	0.768	0.866	0.683	0.72
	INNO2	0.737				
	INNO3	0.829				
INOT	INOT1	0.701	0.721	0.839	0.635	0.69
	INOT2	0.745				
	INOT3	0.879				
SSCM	SSCM1	0.859	0.813	0.889	0.728	0.60
	SSCM2	0.831				
	SSCM3	0.778				

Source: Researchers' computation (2026)

Table 4 shows how measurement model is evaluated concerning reliability and validity with indicator loading, internal consistency reliability, convergent validity and discriminant validity. All the constructs indicators loading exceeds the recommended threshold of 0.70 which shows that the measurement items are powerful and sound indicators of the respective latent constructs. This implies that the items that are retained are all useful in explaining the underlying variables of the test, and no item is weakly or problematically loaded. With regard to internal consistency reliability, the Cronbach alpha (0.70) and Composite Reliability (CR) of each construct are all above the required minimum of 0.70. This shows that there is a great degree of consistency between the items that measure each construct. The constructs of BUSU, SSCM, and OPEF have shown to be especially reliable, which proves that the measurement scales employed in this study are consistent and reliable.

In terms of convergent validity, all constructs have an Average Variance Extracted (AVE) of more than the recommended amount of 0.50. This means that each construct accounts to over 50 percent of the variance of its indicators ascertaining that the items of a construct tend to converge adequately to measure the same concept. This ensures that there is no question of multicollinearity or overlapping of constructs and each variable represents a different dimension in the model. The findings revealed that the measurement model meets all the required criteria of reliability and validity. As such, the constructs applied in this study are relevant and sufficient to further the analysis of the structural model.

Table 5: Structural Model Results: Path Coefficients and Significance

Path	β	Std. Dev.	t-value	p-value	f ²	Decision
INMT -> BUSU	0.594	0.807	1.928	0.002	0.589	Supported
LOEF -> BUSU	0.112	0.950	1.087	0.003	0.027	Supported
SUCO -> BUSU	0.204	1.015	1.802	0.000	0.068	Supported
ENIN -> OPEF	0.020	1.194	1.602	0.000	0.005	Supported
GRPR -> OPEF	-0.017	1.233	2.083	0.000	0.003	Supported
WAMA -> OPEF	0.957	1.056	1.638	0.001	9.171	Supported
ARIA -> SSCM	0.318	0.974	5.377	0.001	0.404	Supported
INNO -> SSCM	0.044	1.129	4.689	0.000	0.008	Supported
INOT -> SSCM	0.753	1.098	4.367	0.000	2.465	Supported

Source: Researchers' computation (2026)

Table 5 displays the results of the structural model, which reveal all the hypothesized relationships to be statistically significant, based on the p-value below the 0.05 confident limit. Innovation management (INMT) revealed the most significant predictor (0.594) in the description of business sustainability (BUSU), indicating the significance of innovative practices in the improvement of sustainability in SMEs. There is also a positive impact of supply chain orientation (SUCO) (0.204), and a less pronounced yet significant impact of logistics efficiency (LOEF) (0.112). The implication of these findings is that, despite many factors that help enhance sustainability, the most effective factor is the innovation-based strategies that enhance business performance in the long term.

In terms of operational efficiency (OPEF) and sustainable supply chain management (SSCM), waste management (WAMA) has the strongest positive impact on operational efficiency (0.957), which can

be regarded as the significance of waste management in streamlining the functioning of firms. Environmental initiatives (ENIN) and green procurement (GRPR) demonstrate weak negative correlation, indicating little practical influence. In the case of SSCM, the variable with the strongest impact is innovation orientation (INOT, 2.465 and 0.753) and awareness (ARIA) with a moderate impact, and the role of innovation capability (INNO) is important. On the whole, the findings indicate that the effects of innovation and waste management play a central role in sustainability and operational efficiency of SMEs, even though the magnitude of the effects varies among constructs.

H₀₁: Efficient supply chain management has no significant effect on the business sustainability of SMEs in emerging markets

Table 6: Significant effect of efficient supply chain management on the business sustainability of SMEs in emerging markets

Items	Mean	Standard deviation	Test statistic	R-square	P-value
BUSU1	4.059	0.968	4.53	0.593	0.000
BUSU2	4.041	0.926	4.098		0.000
BUSU3	3.95	0.933	4.422		0.000
INMT1	3.947	1.121	3.728		0.001
INMT2	3.703	1.351	3.621		0.000
INMT3	3.971	1.129	4.689		0.003
LOEF1	4.159	0.945	4.905		0.000
LOEF2	4.141	0.925	4.71		0.000
LOEF3	3.791	1.13	3.479		0.000
SUCO1	3.829	1.258	4.657		0.000
SUCO2	4.138	1.015	4.923		0.000
SUCO3	4.062	1.046	4.161		0.004

Source: Researchers' computation (2026)

Table 6 presents the descriptive statistics and significance of the indicators measuring Business Sustainability of SMEs (BUSU) and selected components of Sustainable Supply Chain Management (SSCM), namely Inventory Management (INMT), Logistic Efficiency (LOEF), and Supplier Collaboration (SUCO). The results show that the BUSU indicators recorded high mean values ranging from 3.950 to 4.059, indicating that respondents generally agreed that SMEs demonstrate elements of business sustainability. The standard deviations (0.926–0.968) show low dispersion in responses. The test statistics for BUSU items range from 4.098 to 4.53, and the p-values (0.000) indicate statistical significance. The R-square value of 0.593 implies that about 59.3% of the variation in SME business sustainability is explained by the model.

For Inventory Management (INMT), the mean scores range from 3.703 to 3.971, meaning that there is moderate agreement among respondents on the effectiveness of inventory practices. The test statistics (3.621–4.689) and p-values below 0.05 indicate that inventory management significantly contributes to sustainable supply chain practices. Similarly, Logistic Efficiency (LOEF) shows high mean values between 3.791 and 4.159, indicating that efficient logistics operations are widely recognized among SMEs. The test statistics (3.479 – 4.905) with p-values of 0.000 confirm that logistic efficiency significantly influences SME sustainability. For Supplier Collaboration (SUCO), the mean values range from 3.829 to 4.138, indicating positive perceptions of collaboration between SMEs and suppliers. The test statistics (4.161 – 4.923) and significant p-values show that supplier collaboration is an important factor in sustainable supply chain management.

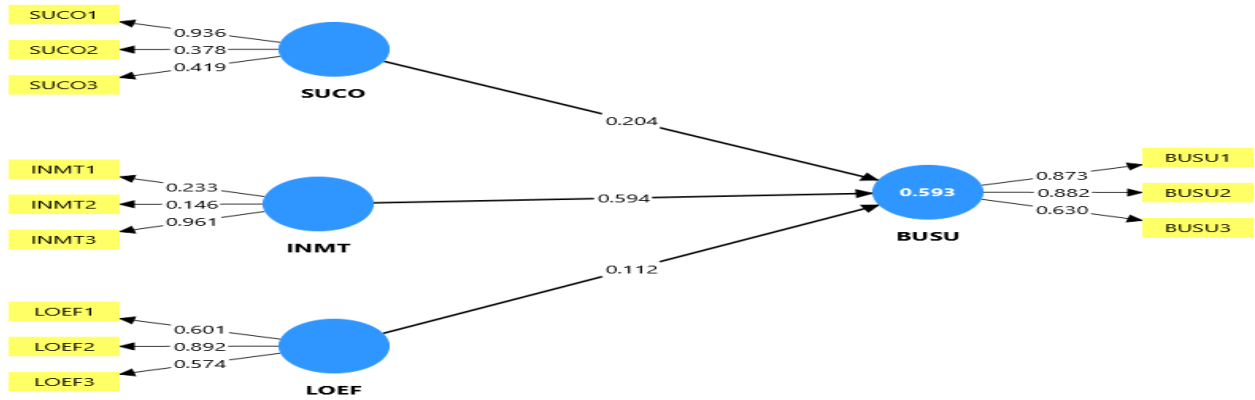


Figure 1: Structural model of Significant effect of efficient supply chain management on the business sustainability of SMEs in emerging markets

Source: Researchers’ computation (2026)

Figure 1 demonstrates how efficient supply chain management affects business sustainability of small and medium-sized enterprises (SMEs) in emerging markets. The model demonstrates the correlation between three important supply chain management practices supplier collaboration (SUCO), inventory management (INMT), and logistic efficiency (LOEF) and business sustainability (BUSU). The findings indicate that the supply chain management variables have a positive influence on the business sustainability of SMEs. Inventory management has the highest path coefficient of 0.594, indicating that the high level of inventory control and monitoring has a significant positive impact on the business sustainability of SMEs. Business sustainability is also positively correlated with the supplier collaboration with a path coefficient of 0.204 indicating that the high level of collaboration between SMEs and suppliers positively influences business sustainability. The logistic efficiency affects business sustainability with a path coefficient of 0.112, meaning that efficient transportation and distribution also affect business sustainability. In addition, the coefficient of determination (R²) for business sustainability is 0.593, which means that 59.3% of the variance of the business sustainability of SMEs is explained by effective supply chain management practices in the model. In general, the model shows that supply chain management can be significant in improving the sustainability of the SMEs in the emerging markets.

H₀₂: Sustainable supply chain practices do not significantly improve operational efficiency among SMEs.

Table 7: Significantly effect of Sustainable supply chain practices on operational efficiency among SMEs.

Item	Mean	Standard deviation	Test statistic	R-square	P-value
ENIN1	3.885	1.194	5.000	0.912	0.001
ENIN2	4.103	0.807	6.420		0.000
ENIN3	3.888	0.991	3.858		0.000
GRPR1	3.703	1.233	3.152	0.912	0.003
GRPR2	3.797	1.224	3.564		0.000
GRPR3	3.997	0.950	4.141		0.000
OPEF1	3.885	1.015	3.943	0.912	0.004
OPEF2	3.847	1.122	4.541		0.000
OPEF3	4.135	0.811	5.531		0.001
WAMA1	3.926	1.056	4.841	0.912	0.002
WAMA2	3.885	1.015	3.943		0.000
WAMA3	3.924	1.060	4.884		0.002

Source: Researchers’ computation (2026)

Table 3 shows the statistical findings based on which the hypothesis that sustainable supply chain practices have no significant effects on operational efficiency among SMEs. The sustainable supply chain practice considered are environmental initiatives (ENIN), green procurement (GRPR), and waste

management (WAMA), whereas operational efficiency (OPEF) is the outcome variable. The findings demonstrate that the means of the indicators fall within the ranges of 3.703-4.135, which means that the respondents tended to agree that SMEs implement sustainable supply chain practices and that these practices help to achieve operational efficiency. All the indicators have a relatively high statistics value and the p-values are all less than the 0.05 level of significance which means that all the variables are statistically significant. Moreover, R-squared of 0.912 shows that sustainable supply chain practices account 91.2 percent of the variability in operational efficiency among SMEs. The null hypothesis that sustainable supply chain practices do not have a significant impact on the operational efficiency of SMEs is rejected based on the high p-values. This means that environmental initiatives, green procurement, and waste management enhance the operational efficiency of SMEs significantly.

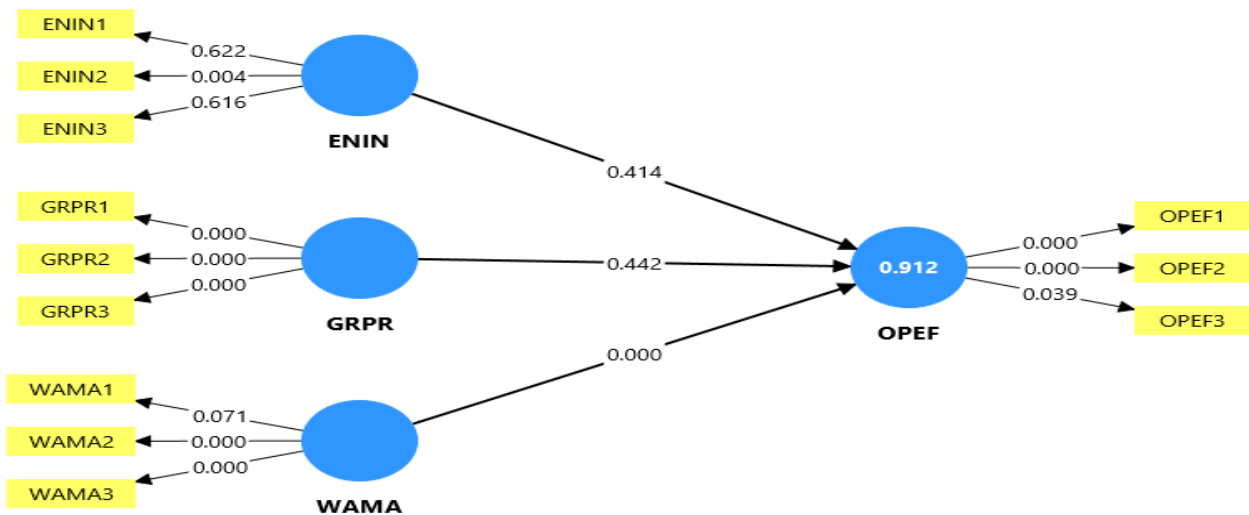


Figure 2: Structural model of significantly effect of Sustainable supply chain practices on operational efficiency among SMEs

Source: Researchers’ computation (2026)

The figure 2 shows the structural model that explores the impact of the selected practices of sustainable supply chain management on the operational efficiency of SMEs. The primary sustainability practices that affect operational efficiency (OPEF) are Environmental Initiatives (ENIN), Green Procurement (GRPR), and Waste Management (WAMA). The results show that the three constructs together explain a large proportion of the variation in the operational efficiency with an R^2 of 0.912. It implies that the environmental initiatives, green procurement, and waste management practices explain 91.2 percent of the change in the operational efficiency of SMEs, which means that the model has a high explanatory power. The most positive effect on operational efficiency ($b = 0.442$) and environmental initiatives ($b = 0.414$) is exerted by green procurement. This implies that the environmentally responsible SMEs in purchasing and environmental practices have a higher likelihood of improving their performance in terms of operations. Waste management ($\beta = 0.000$) does not, however, have a significant impact on the operational efficiency, which implies that it may not directly affect the operational improvements in the context of the situation under study. The findings show that green procurement and environmental programs are sustainable supply chain practices that play a significant role in enhancing the operational performance of SMEs.

H₀₃: Digital technologies and innovations have no significant impact on the implementation of sustainable supply chain management in SMEs.

Table 8: Significant impact of digital technologies and innovations on the implementation of sustainable supply chain management in SMEs

Items	Mean	Standard deviation	Test statistic	R-Square	p- value
ARIA1	3.962	0.974	5.377		0.000
ARIA2	3.868	1.175	4.368		0.002

ARIA3	3.915	1.058	4.065		0.002
INNO1	3.971	1.129	4.689		0.000
INNO2	4.215	0.825	5.103		0.000
INNO3	4.141	0.925	4.710		0.001
INOT1	3.856	1.098	4.367		0.000
INOT2	3.982	0.945	5.339		0.000
INOT3	4.153	0.904	4.845		0.000
SSCM1	4.153	0.904	4.845	0.788	0.003
SSCM2	4.135	0.951	4.342		0.000
SSCM3	4.035	1.057	3.998		0.004

Source: Researchers' computation (2026)

The third hypothesis is that digital technologies and innovations do not play a considerable role in implementing sustainable supply chain management in SMEs. The digital technologies and innovations involved in this study are artificial intelligence adoption (ARIA), internet of things (INOT), and innovation (INNO). The findings shown that the indicators regarding digital technologies and innovation have quite high mean scores, which means that respondents agreed that such technologies are becoming more and more used by SMEs to facilitate supply chain operations. The p-values are under the level of significance of 0.05 and the test statistics are relatively high, a fact that suggests that the variables have a statistical significance in the explanation of implementing sustainable supply chain management. These results imply that digital technologies help in implementing sustainable supply chain management among SMEs. Artificial intelligence adoption assists in better decision-making and data analysis in the supply chain operation, whereas the internet of things improves real-time tracking of logistics and inventory systems. Innovation also assists in coming up with better processes that attract efficiency and sustainability in the operations of the supply chain. According to the statistical significance of the findings, the null hypothesis is rejected. This means that digital technologies and innovations play a major role in the application of sustainable supply chain management in SMEs. The results thus suggest that digitization of the supply chain integration is significant in enhancing sustainable practices among SMEs.

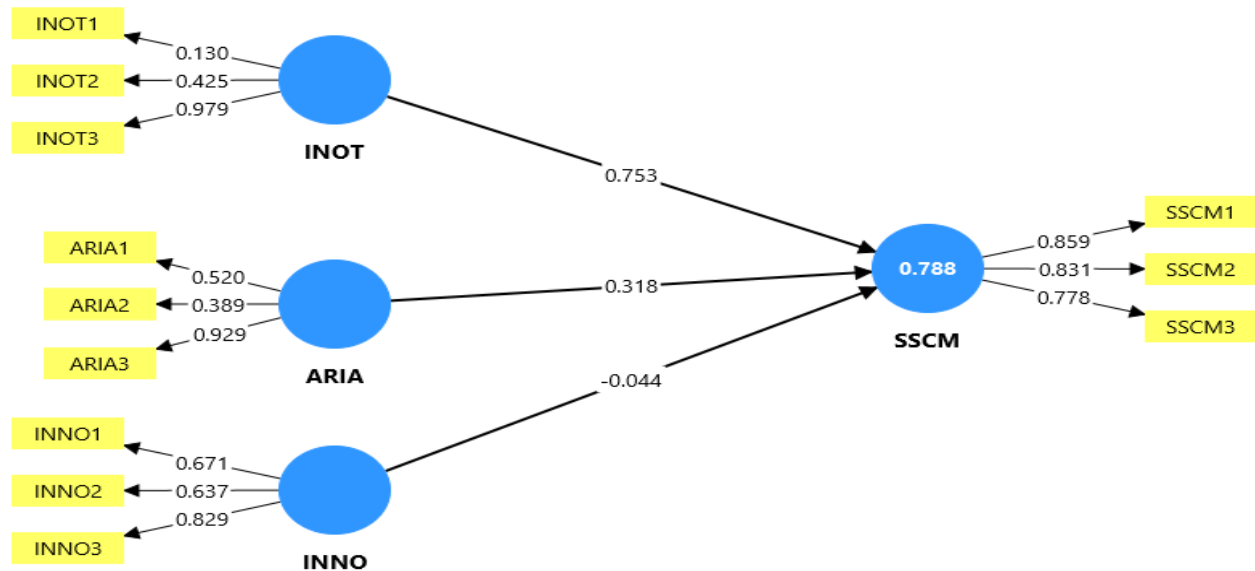


Figure 3: Structural model of significant impact of digital technologies and innovations on the implementation of sustainable supply chain management in SMEs

Source: Researchers' computation (2026)

The structural model in Figure 3 shows how digital technologies and innovation affect the adoption of Sustainable Supply Chain Management (SSCM) in SMEs. The model demonstrates that the predictors describe a significant percentage of the variance in SSCM, with an R^2 of 0.788, meaning that 78.8 percent of the changes in the implementation of SSCM can be explained by Internet of Things (INOT), Artificial Intelligence Adoption (ARIA), and Innovation (INNO). The findings also show that the

Internet of Things positively influences SSCM most strongly ($b= 0.753$), implying that the use of IoT technologies contributes greatly to sustainable supply chain practices among SMEs through better monitoring, coordination, and operational efficiency. Artificial Intelligence Adoption also shows a positive effect on SSCM ($b= 0.318$), meaning that AI contributes to the implementation of sustainable supply chains with the help of data driven decision making and optimization of processes. On the other hand, Innovation exhibits negative correlation with SSCM ($b= -0.044$), which suggests that the general innovation activities may not be of any significance in ensuring sustainable supply chain practices among SMEs if other factors are not put into consideration. In general, the results demonstrate the significant role of digital technologies, especially IoT and AI, in enhancing sustainable supply chain management in SMEs working in the emerging markets.

6.1 Discussion of Findings

The conclusions of the research are in tandem with recent literature that highlights the relevance of effective and sustainable supply chain management in enhancing sustainability and performance of SMEs. The means of the descriptive statistics show that Business Sustainability of SMEs (BUSU) is high and thus there is an overall agreement among the respondents that SMEs exhibit features of sustainable business practices. The fact that the R^2 value is 0.593 also suggests that the supply chain management practices can explain a substantial amount of the variation in the sustainability of SMEs. This is in line with research findings that indicate that supply chain management performance improves SME resilience, competitiveness, and long-term sustainability in new markets (Kamble et al., 2023; Dubey et al., 2024). The results of the structural model indicate that inventory management, supplier collaboration, and logistic efficiency have a positive impact on the sustainability of the SME. The most significant impact of inventory management on business sustainability is evident, which explains the significance of effective inventory control when it comes to lowering operational expenses and waste. The collaboration of suppliers also has a positive impact in that it helps in information sharing and coordinated planning between the SMEs and the suppliers. Although smaller in impact, logistic efficiency is pro-sustainable in terms of enhanced transportation and distribution. These results coincide with the studies that have found that an effective supply chain coordination enhances the economic and environmental performance (Khan et al., 2024; Gupta & Singh, 2024).

The findings also indicate that sustainable supply chain practices are major way to enhance the efficiency of operations among SMEs. Environmental programs and green procurement show significant positive results on the efficiency of operations, which shows that green practices have the potential to lead to increased productivity and resource use. Nevertheless, there is no significant impact of waste management, which implies that the majority of SMEs are yet to establish waste management systems with the potential to produce operational benefits (Agyabeng-Mensah et al., 2023; Kumar et al., 2023). Additionally, the research paper also emphasizes a significant role of digital technologies in enhancing sustainable supply chain management. The findings indicate that the usage of Internet of Things (IoT) and artificial intelligence (AI) plays a significant role in the adoption of sustainable supply chain practices. Technologies improve real-time tracking, data analytics, and decision-making in supply chains. Nevertheless, the impact of innovation is weak, implying that innovation has to be connected with digital technologies and sustainability strategies to contribute to sustainable supply chain management efficiently (Kamble et al., 2023; Dubey et al., 2024). Comprehensively, the results indicate that the incorporation of effective supply chain management, sustainability efforts, and digital solutions can greatly improve the sustainability of SMEs in emerging economies.

6.2 Theoretical and practical implication of the findings.

The research results presented theoretical and practical implications to comprehend the concept of SME sustainability in the context of supply chain management. Theoretically, the findings support the applicability of Supply Chain Sustainability Theory as they empirically prove that innovation management, collaboration with suppliers, and logistics efficiency are the key contributors to the business sustainability, and sustainable practices and digital technologies contribute to the further sustainability of the operations and supply chain management. The powerful impact of digital

technologies like IoT and AI further expand the existing theory by illustrating the increasing significance of technology-driven sustainability in new markets, thus adding to the literature by combining the traditional supply chain operations with the contemporary digital change in explaining the performance of SMEs.

In practice, the findings indicate that major areas that SME managers and policymakers in emerging economies need to focus on include the use of effective inventory systems, waste management practices and the use of digital technologies to enhance both the sustainability and performance of the operations. The high impact technological innovation and capacity building investments are vital to competitiveness, whereas the comparatively low implications of certain practices (e.g., green procurement and environmental programs) suggest that their implementation should have superior frameworks and policy support. Overall, the study will be useful to SMEs in adopting integrated supply chain and sustainability strategies, as well as inform the stakeholders to create policies that facilitate resource efficiency, innovation, and business resiliency in the long term.

6.3 Conclusion

This study examined the role of efficient supply chain management, sustainable practices, and digital technologies in enhancing the sustainability and operational efficiency of SMEs in emerging markets. The findings reveal that supply chain management practices inventory management, supplier collaboration, and logistic efficiency have positive effects on the business sustainability of SMEs, with inventory management showing the strongest influence. The results also show that sustainable supply chain practices, particularly environmental initiatives and green procurement, significantly improve the operational efficiency of SMEs, while waste management shows no significant effect in this context. Furthermore, digital technologies such as the Internet of Things (IoT) and artificial intelligence (AI) play an important role in supporting the implementation of sustainable supply chain management. Overall, the study demonstrates that integrating efficient supply chain practices, sustainability initiatives, and digital technologies can significantly enhance the sustainability and performance of SMEs in emerging markets.

6.4 Recommendations

- i. SMEs should invest in effective inventory planning and monitoring systems to reduce overstocking, minimize waste, and ensure efficient utilization of resources, thereby strengthening business sustainability.
- ii. SMEs should build long-term partnerships with suppliers through improved communication, information sharing, and joint planning.
- iii. Firms should adopt improved logistics planning, transportation management, and distribution systems to reduce operational costs, improve delivery performance, and minimize environmental impact.

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