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## **Effect of Supply Chain Management Practices on the Sustainable Performance of Pharmaceutical Enterprises in Nasarawa State**

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### **Abstract**

*The pharmaceutical sector plays a critical role in public health and economic development; however, many pharmaceutical enterprises in Nasarawa State continue to face operational inefficiencies, particularly across the supply chain. This study examined the effect of Strategic Sourcing and Inventory Management on the sustainable performance of pharmaceutical enterprises in Nasarawa State, Nigeria. Grounded in the Triple Bottom Line (TBL) theory, the research explored how supply chain strategies influence sustainability across financial, social and environmental dimensions. A survey research design was adopted and data were collected from 197 owners and managers of registered pharmaceutical enterprises using a structured questionnaire. Analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results revealed that both strategic sourcing and inventory management have positive and statistically significant effects on sustainable performance, with strategic sourcing demonstrating a stronger influence. Based on these findings, the study recommends that pharmaceutical enterprises adopt integrated sourcing frameworks and modern inventory systems as strategic tools to enhance sustainability, reduce operational waste and improve service delivery in the state's healthcare supply chain.*

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Keywords: Inventory Management, Nasarawa State, Pharmaceutical Enterprises, Strategic Sourcing, Sustainable Performance

### **Introduction**

The pharmaceutical industry is a complex and dynamic sector that underpins public health through the production, procurement and distribution of essential medicines. Valued at approximately



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\$1.48 trillion in 2022 (Statista, 2023), the global pharmaceutical market demands efficient supply chain practices to ensure sustainable performance and competitiveness. In Nigeria, where the pharmaceutical market is estimated at \$4 billion (Pharma West Africa, 2023), strategic sourcing and inventory management are critical to navigating the challenges of a developing economy. Within Nasarawa State, the growth of pharmaceutical enterprises necessitates effective supply chain management practices to meet the healthcare needs of the population and contribute to the state's economic development, particularly given the state's increasing focus on healthcare infrastructure and industrial development initiatives.

As global healthcare systems face mounting pressures from regulatory shifts, supply chain disruptions and evolving consumer expectations, sustainable performance has become a central concern for pharmaceutical enterprises. Sustainability in this context refers to the ability of firms to achieve long-term viability by balancing financial efficiency, environmental responsibility and social impact. In advanced economies such as Germany and Canada, this balance is supported by deliberate supply chain strategies that enhance cost efficiency, product quality and regulatory compliance (Ngo et al., 2024). Two such critical strategies or practice are strategic sourcing and inventory management. They are becoming increasingly recognized as key drivers of sustainable performance in the pharmaceutical sector.

Strategic sourcing involves a structured, data-driven approach to selecting and managing suppliers to optimize value, mitigate risks and improve supply chain responsiveness (Charles & Ochieng, 2023). In the pharmaceutical industry, where the reliability and quality of inputs are critical, strategic sourcing ensures the timely delivery of raw materials and finished products, contributing directly to environmental, social and financial sustainability. Inventory management, on the other hand, encompasses planning and controlling inventory flows to ensure optimal stock levels, minimize waste and enhance service delivery (Mohamed et al., 2024). For pharmaceutical enterprises, where product shelf life, storage conditions and demand volatility are major concerns, effective inventory practices reduce losses from stockouts, overstocking and obsolescence.

Pharmaceutical enterprises in Nasarawa State face persistent operational challenges stemming from fragmented supplier networks, weak inventory control systems and limited access to real-time data. These challenges often result in stock imbalances, increased costs and delayed deliveries. All factors that directly undermine sustainability goals. Poor strategic sourcing compromises product quality and supply reliability, while ineffective inventory practices lead to pharmaceutical waste and regulatory non-compliance. These inefficiencies affect not only the financial performance of enterprises but also their ability to meet public health expectations and environmental obligations.

Despite the acknowledged importance of strategic sourcing and inventory management in sustainable supply chain performance, empirical research on their combined effect in the context



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of emerging markets remains limited. Much of the existing literature focuses on multinational firms in advanced economies, offering limited insights into the realities of small and medium-sized enterprises operating under the constraints of a developing environment like Nasarawa State. This presents a critical gap, particularly given the unique regulatory, infrastructural and market challenges facing pharmaceutical enterprises in the region.

In response, this study investigates the effect of supply chain management practices on the sustainable performance of pharmaceutical enterprises in Nasarawa State. The aim is to generate context-specific evidence on how strategic sourcing and inventory management contribute to economic efficiency, environmental responsibility and social impact. The findings are expected to inform business leaders and policymakers on how to develop and implement supply chain strategies that foster resilience, efficiency and long-term viability in the state's pharmaceutical sector. To guide the investigation and in line with the objectives of the study, the following research hypotheses are posed in null format:

Ho1: Strategic Sourcing has no significant effect on the sustainable performance of pharmaceutical enterprises in Nasarawa State

Ho2: There is no significant effect of inventory management on the sustainable performance of pharmaceutical enterprises in Nasarawa State

## **Literature Review**

### **Concept of Sustainable Performance of Pharmaceutical Enterprises**

Sustainable performance has evolved from a narrow focus on profitability to a multidimensional construct that incorporates environmental stewardship, social responsibility and long-term economic viability. Rooted in the Triple Bottom Line (TBL) framework, sustainable performance is broadly defined as the simultaneous pursuit of economic prosperity, environmental quality and social equity. This perspective is especially relevant to pharmaceutical wholesale and retail enterprises, whose operations affect public health, community well-being and ecological integrity (Schneider et al., 2010). These businesses are not only expected to generate financial returns but also to ensure the ethical distribution of medicines, reduce pharmaceutical waste and contribute positively to societal health outcomes.

In line with this view, sustainable performance in the pharmaceutical context emphasizes the integration of Environmental, Social and Governance (ESG) factors into core operational strategies. As defined by recent scholarship, it involves adopting practices that optimize financial outcomes, minimize environmental harm and promote social equity across the supply chain (Hourneaux Jr et al., 2018; Vangeri et al., 2024). This includes ensuring responsible inventory management to avoid expired drugs, implementing ethical labour standards, reducing energy and



water consumption and maintaining transparent, compliant and inclusive supply chain practices. Furthermore, sustainable performance encompasses long-term organizational resilience, ensuring that firms meet current healthcare demands without compromising the ability of future generations to access essential medicines (Brundtland, 1987; Naciti et al., 2022). In this way, sustainable performance is not merely a regulatory requirement but a strategic imperative for pharmaceutical enterprises striving to survive, thrive and create lasting value in a socially conscious and environmentally constrained world.

### **Strategic Sourcing**

Strategic sourcing is increasingly recognized in supply chain literature as a critical enabler of long-term organizational efficiency, resilience and sustainability. It is a systematic, data-driven approach to procurement that goes beyond cost minimization to encompass quality enhancement, supplier performance and strategic alignment with organizational goals (Giunipero et al., 2019; Tarigan & Siagian, 2021). By analyzing procurement spend and streamlining supplier selection, strategic sourcing ensures optimal resource allocation and facilitates the development of a robust and agile supply base. Yoon and Moon (2019) emphasize its role in rationalizing supplier portfolios to achieve long-term cost efficiencies, while Monczka et al. (2021) highlight its function as a value-creating framework that integrates procurement with organizational performance metrics such as quality assurance, risk reduction and operational continuity.

More recent contributions expand the scope of strategic sourcing to include supplier collaboration, innovation and sustainability. O'Brien (2024) and Pakanati et al. (2023) argue that sourcing must be viewed not merely as a transactional function, but as a platform for co-creating value through strategic partnerships with suppliers. This includes joint problem-solving, shared innovation and proactive risk management. These capabilities that are particularly critical in regulated and dynamic industries like pharmaceuticals. Bag et al. (2020) and Schiele (2019) further stress the importance of embedding social and environmental criteria into sourcing decisions, positioning procurement as a key driver of organizational sustainability. Accordingly, strategic sourcing has evolved into an integrative function that strengthens supply chain responsiveness, fosters supplier-led innovation and supports the achievement of economic, social and environmental goals. This holistic understanding forms the conceptual foundation of the present study, particularly as it relates to sustainability in pharmaceutical wholesale and retail enterprises.

### **Inventory Management**

Inventory management is a core operational function that plays a vital role in balancing supply with demand while minimizing the financial and operational costs associated with holding and replenishing stock. It encompasses the strategic planning, monitoring and control of inventory levels to ensure timely product availability without incurring the inefficiencies of stockouts or



overstocking (Muchaendepi et al., 2019; Orobia et al., 2020). Song et al. (2020) emphasize that poor inventory control, whether through shortages or excess can lead to service disruptions, customer dissatisfaction and financial losses. These scholars stress the need for dynamic inventory systems that can adapt to real-time demand fluctuations, production schedules and supply chain uncertainties, particularly in sectors like pharmaceuticals where precision and product integrity are critical.

Contemporary literature also frames inventory management as an integrative, cross-functional capability that contributes to broader supply chain and organizational objectives. Krajewski and Malhotra (2022) and Tien et al. (2019) underscore its role in enhancing logistics coordination, customer responsiveness and overall operational efficiency. Emerging strategies such as Demand-Driven Inventory Management (DDIM) and Supply Chain Inventory Optimization (SCIO), as highlighted by Biswas and Sarker (2020) and Yang et al. (2021), further demonstrate how aligning inventory practices with actual market signals can lead to reduced waste, optimized replenishment and improved service quality. In support of this, Olaniyi and Pugal (2024) and Juhara (2024) highlight inventory control techniques such as Economic Order Quantity (EOQ) and valuation methods as essential tools for minimizing risks and maintaining financial health. Collectively, these contributions frame inventory management not merely as a logistical necessity, but as a strategic lever for resilience, sustainability and value creation in competitive and highly regulated sectors like pharmaceutical wholesale and retail.

### **Strategic Sourcing and Sustainable Performance**

Harouache et al. (2024) investigated the effect of supply chain management practices on sustainability in the Algerian construction industry using survey data from 237 respondents in Algiers and analyzed through PLS-SEM. The study found that strategic sourcing had a positive and significant impact on sustainability. However, its focus on a single sector and location limits the generalizability of the findings, which is a gap addressed in the current study by targeting the pharmaceutical industry in North Central Nigeria.

Shamsuddin et al. (2020) examined the impact of supply chain management practices on sustainable performance among 59 manufacturing firms in Batu Pahat, Malaysia, using a mixed-methods approach. The study found that strategic sourcing positively influenced business sustainability. However, limitations included unclear respondent details and limited geographic scope, which affect the generalizability of the findings.

Odesola and Aderemi (2022) investigated the effect of green supply chain management practices on the operational and environmental performance of SMEs in Southwest Nigeria, using a cross-sectional survey of 330 firms and PLS-SEM analysis. The study found that strategic sourcing had a positive and significant effect on sustainability. However, methodological flaws including unclear sampling procedures, weak model assessment and inconsistencies in data analysis, raise



concerns about the reliability of the findings. The study was also geographically limited to the Southwest region.

Le (2020) assessed the impact of supply chain management practices on sustainable performance among 218 certified construction material manufacturers in Vietnam using PLS-SEM. The study found that strategic sourcing significantly influenced social and economic performance but had no effect on environmental performance. However, concerns about sample adequacy and representation raised questions about the reliability and generalizability of the findings.

Sharma (2020) examined the impact of strategic sourcing on sustainable performance using secondary data from 340 assembly fabricating firms across 13 countries, based on the IMSS 6 survey. The study found a positive and significant effect of strategic sourcing on economic and social sustainability. However, it excluded the environmental dimension, which limits its comprehensiveness, a gap addressed in the current study.

### **Inventory Management and Sustainable Performance**

Tangonan et al. (2024) explored the relationship between inventory management practices and business sustainability among SMEs in Valencia City, Philippines, using a correlational design and Pearson correlation analysis. The study found a positive but moderate association between the variables. However, limitations such as unclear sampling procedures, lack of conceptual clarity, absence of a theoretical framework and the use of a non-causal design weaken the reliability and explanatory power of the findings. These are issues addressed in the current study through a causal and theory-driven approach.

Gatari et al. (2022) examined the effect of inventory management on sustainable performance among 187 state-owned corporations in Kenya, using data from 304 finance and procurement heads. Employing an OLS regression analysis, the study found a positive and significant relationship. However, its focus on public-sector organizations in Kenya presents both geographic and sectoral limitations, which the current study addresses by investigating pharmaceutical enterprises in North Central Nigeria.

Okolocha et al. (2022) investigated the effect of inventory resource management on the sustainable performance of SMEs in Enugu State using a cross-sectional survey and multiple regression analysis. The study found a positive and significant relationship between inventory management and sustainability. However, methodological limitations such as the use of purposive sampling, absence of a theoretical framework and lack of clarity on respondent identity and sample size determination, raise concerns about the reliability and replicability of the findings.



### **Triple Bottom Line (TBL) Theory**

The theoretical foundation of this study is the Triple Bottom Line (TBL) Theory. It was articulated by Elkington (1997). The theory argues that organizational success is measured not only by financial performance but also by social and environmental outcomes. The framework emphasizes that sustainable organizations must simultaneously focus on financial prosperity, social responsibility and environmental stewardship. In the context of pharmaceutical enterprises in Nasarawa State, this means balancing financial goals with social obligations, such as ensuring equitable access to healthcare products and upholding ethical standards, while also minimizing environmental impacts through sustainable practices.

This theory provides a guide for understanding how strategic sourcing and inventory management contribute to the sustainable performance of pharmaceutical enterprises. By optimizing sourcing strategies and inventory levels, firms can enhance financial sustainability through cost savings and improved operational efficiency. At the same time, these practices promote social sustainability by ensuring the timely delivery of essential healthcare products and fostering equitable access. Furthermore, by adopting sustainable sourcing and inventory management practices, pharmaceutical enterprises can reduce waste, minimize environmental footprint and advance environmental sustainability. Thus, it emphasises the interconnectedness of financial, social and environmental performance, thereby highlighting the need for pharmaceutical enterprises to adopt a holistic approach to sustainability that balances economic, social and environmental responsibilities.

### **Methodology**

This study adopted a survey research design, which is suitable for investigating the relationships among strategic sourcing, inventory management and the sustainable of pharmaceutical enterprises. The target population consisted of 260 registered pharmaceutical enterprises in Nasarawa State, as documented by the Nasarawa State Office of the Pharmacy Council of Nigeria (PCN). Given the manageable size of the population, the study employed a census approach to ensure comprehensive data collection and enhance the generalizability of findings.

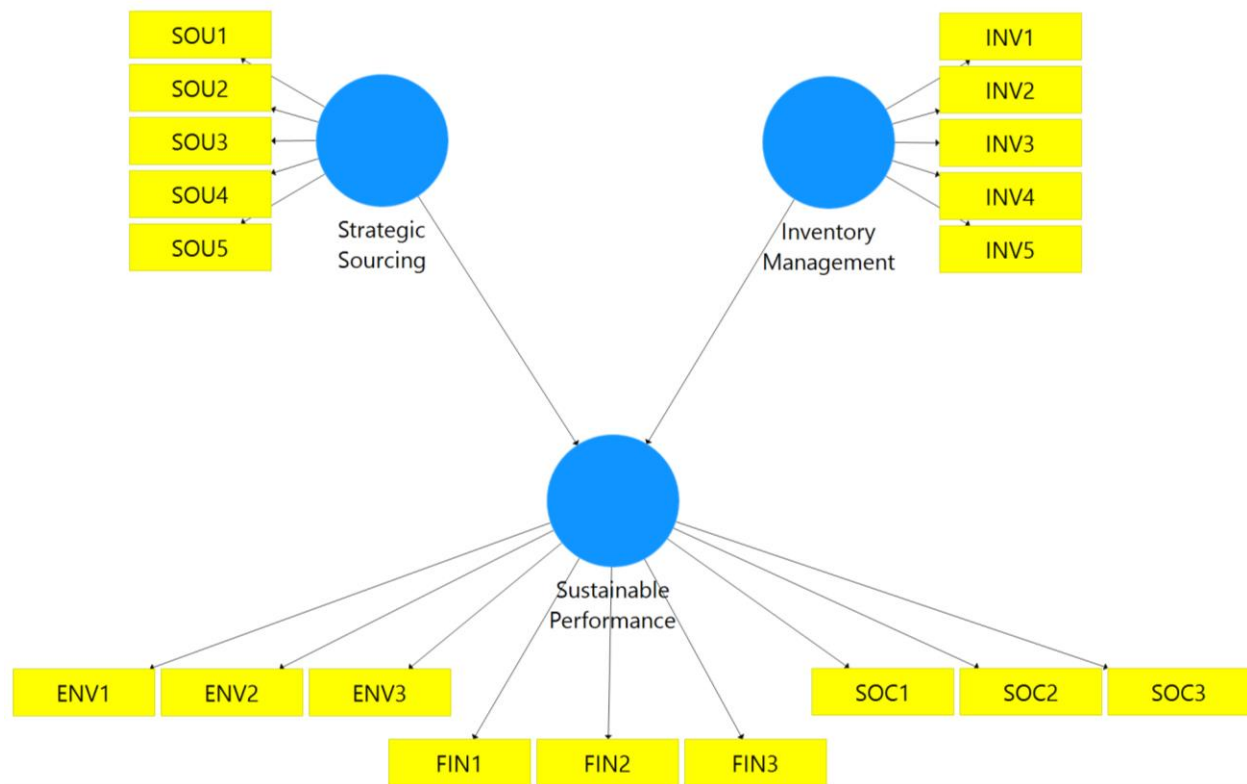
The study relied on primary data, which was deemed most appropriate for assessing the effect of strategic sourcing and inventory management on the sustainable performance of pharmaceutical enterprises in the state. Data were collected using a structured questionnaire designed to measure strategic sourcing, inventory management and sustainability dimensions. The questionnaire items were adapted from validated instruments used in prior studies. They are Talluri and Narasimhan (2004), Choi and Hartley (1996) and Narasimhan and Das (2001) for strategic sourcing, Ramaa et al. (2012) for inventory management and Hourneaux Jr et al. (2018) and Elkington (1997) for sustainable performance.



Responses were recorded using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), enabling the quantification of attitudes and perceptions related to the constructs under investigation. For data analysis, the study employed the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique using SmartPLS version 3.0. This analytical approach is suitable for modeling complex relationships between latent constructs, testing hypotheses and estimating the direct and indirect effects of the independent variables (strategic sourcing and inventory management) on the dependent variable (sustainable performance of pharmaceutical enterprises).

**Figure 1**

*Structural Model for Strategic Sourcing and Inventory Management on Sustainable performance of Pharmaceutical Enterprises*



Note. SmartPLS Output, 2025



**Table 1**

*Measurement of Variables Tables*

<b>Variables</b>	<b>Designator</b>	<b>Variable Measurement</b>	<b>Sources</b>
<b>Sustainable Performance (DV)</b>	FIN, SOC, ENV	Our business has experienced consistent financial growth over the past few years. We have maintained profitability while managing operational costs effectively. Our financial strategies support long-term viability and competitiveness. We are committed to ethical business practices and fair treatment of employees. Our organization supports community development and social impact initiatives. Employee welfare, safety and satisfaction are key priorities in our operations. We have implemented eco-friendly practices to reduce environmental impact. Our waste management and recycling practices align with environmental standards. We actively seek to minimize pollution and resource consumption in our operations.	Hourneaux Jr et al. (2018); Elkington (1997)
<b>Strategic Sourcing (IV1)</b>	SOU	Our organization engages in long-term relationships with key suppliers to ensure strategic alignment. Supplier selection in our firm is based on quality, reliability and strategic fit rather than just cost. We actively involve key suppliers in the product development and planning process. Strategic sourcing decisions are based on data-driven analysis of total cost of ownership. Our organization regularly evaluates and reviews sourcing strategies to align with business goals.	Talluri & Narasimhan (2004); Choi & Hartley (1996); Narasimhan & Das (2001)
<b>Inventory Management (IV2)</b>	INV	Our organization maintains optimal inventory levels to minimize stockouts and overstocking. We use inventory tracking systems to monitor stock levels in real time. Inventory decisions are guided by accurate demand forecasting and consumption trends. Our firm regularly reviews inventory turnover rates to improve efficiency. We have clear policies and procedures for managing obsolete or expired inventory.	Ramaa et al. (2012)

*Note.* Researcher's Compilation



**Results and Discussions**

Out of 260 registered pharmaceutical enterprises in the state, 197 provided valid responses, which were used for analysis. The data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS software.

**Table 2**  
*Indicator Loadings*

	<b>Inventory Management</b>	<b>Strategic Sourcing</b>	<b>Sustainable Performance</b>
ENV1			0.805
ENV2			0.757
ENV3			0.701
FIN1			0.823
FIN2			0.741
FIN3			0.816
INV1	0.813		
INV2	0.826		
INV3	0.760		
INV4	0.785		
INV5	0.781		
SOC1			0.755
SOC2			0.820
SOC3			0.843
SOU1		0.845	
SOU2		0.807	
SOU3		0.762	
SOU4		0.861	
SOU5		0.795	

*Note.* SmartPLS Output, 2025

The indicator loadings show how well each item measures its construct: Inventory Management (INV), Strategic Sourcing (SOU) and Sustainable Performance (SUS). Loadings above 0.70 indicate acceptable reliability. All five Inventory Management indicators (INV1 to INV5) loaded strongly, ranging from 0.760 to 0.826, confirming good measurement. Strategic Sourcing indicators (SOU1 to SOU5) also performed well, with values between 0.762 and 0.861, showing strong construct representation. Sustainable Performance includes environmental, financial and social dimensions. Environmental items (ENV1 to ENV3) had moderate loadings (0.701 to 0.805). Financial items (FIN1 to FIN3) and social items (SOC1 to SOC3) showed strong reliability, with



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values above 0.74 and up to 0.843. Thus, it is safe to say all items met the threshold, confirming the constructs are valid and reliable for further analysis.

The results of the measurement model also indicate that all constructs demonstrate strong reliability and validity. Cronbach's Alpha values for Inventory Management (0.853), Strategic Sourcing (0.873) and Sustainable Performance (0.920) all exceed the minimum threshold of 0.70, confirming internal consistency. Similarly, the composite reliability values, which range from 0.894 to 0.934, further affirm that the items used to measure each construct are reliable. The Average Variance Extracted (AVE) values for all three constructs also surpass the 0.50 benchmark, indicating adequate convergent validity. These results show that the measurement model is robust, with each construct reliably capturing the intended latent variable.

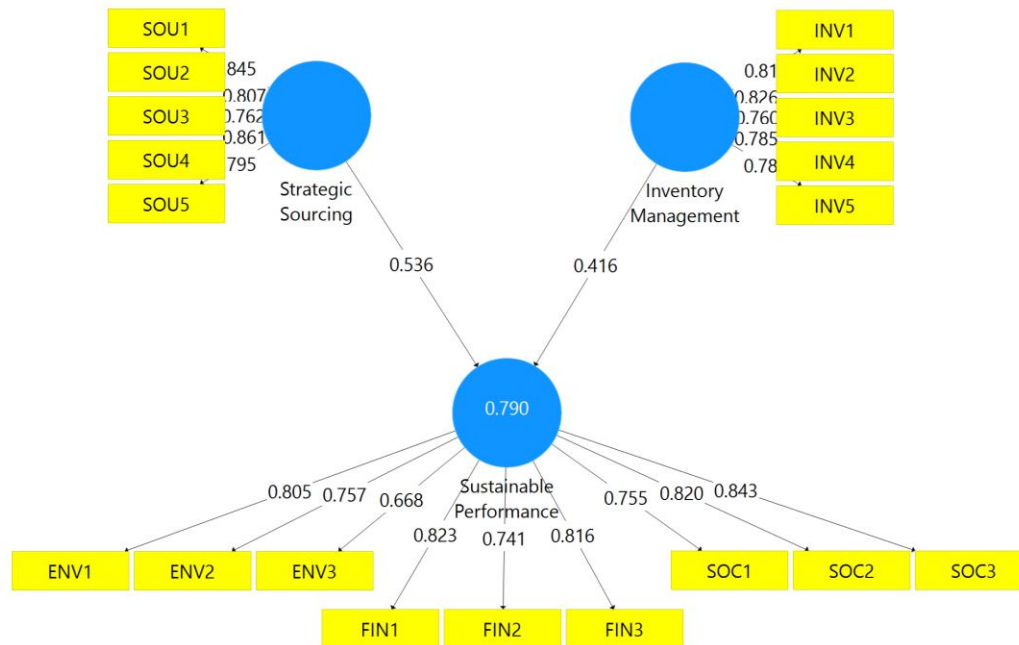
Discriminant validity was assessed using both the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). Based on the Fornell-Larcker results, the square root of each construct's AVE is greater than its correlation with other constructs, indicating acceptable discriminant validity. The HTMT values, which are all below the recommended ceiling of 0.90, provide additional evidence that the constructs are empirically distinct from one another.

### **Assessing the Structural Model**

Having satisfied the measurement model assessment, the next step in evaluating PLS-SEM results is to assess the structural model. Standard assessment criteria, which was considered include the path coefficient, t-values, p-values and coefficient of determination ( $R^2$ ). The bootstrapping procedure was conducted using a resample of 5000.



**Figure 2**  
*Estimated Path Model*



*Note.* SmartPLS Output.

According to Hair et al. (2019), an R-square ( $R^2$ ) value represents the proportion of variance in the dependent variable that is explained by the independent variables in a structural model. In this case, an  $R^2$  value of 0.790 indicates a substantial level of explanatory power, meaning that 79% of the variance in the sustainable performance of pharmaceutical enterprises is accounted for by Strategic Sourcing (SOU) and Inventory Management (INV).

Thus, based on this guideline, the  $R^2$  value of 0.790 implies that the model has strong predictive accuracy. It suggests that SOU and INV are critical drivers of sustainable performance in pharmaceutical enterprises in Nasarawa State. The remaining 21% of the variation is unexplained by the model and may be attributed to other factors not captured in this study. According to Hair et al. (2019), this residual variation is normal and expected in most empirical studies, highlighting the possibility for future research to investigate other variables that may influence sustainability.



**Table 3 Path Coefficients**

	$\beta$	Mean	STDev	t	p	HO Decision
INV -> SUS	0.416	0.442	0.088	4.746	0.000	Reject
SOU -> SUS	0.536	0.505	0.099	5.390	0.000	Reject

Note. SmartPLS Output, 2025

The structural model results reveal that both Inventory Management and Strategic Sourcing have statistically significant positive effects on Sustainable Performance. Specifically, the path coefficient from Inventory Management to Sustainable Performance is 0.416, with a t-statistic of 4.746 and a p-value of 0.000, indicating a strong and significant relationship. Similarly, Strategic Sourcing shows an even stronger effect on Sustainable Performance, with a path coefficient of 0.536, a t-statistic of 5.390 and a p-value of 0.000.

### Discussion of Findings

The findings of this study underscore the critical role of strategic supply chain management practices in enhancing the sustainable performance of pharmaceutical enterprises in Nasarawa State. Both strategic sourcing and inventory management emerged as significant contributors to sustainability, suggesting that enterprises that adopt structured and efficient supply chain practices tend to perform more sustainably across financial, social and environmental dimensions.

The positive effect of strategic sourcing highlights the importance of deliberate and data-driven supplier engagement in improving enterprise performance. Practices such as careful supplier selection, risk mitigation and long-term collaboration appear to support consistent input quality, cost efficiency and responsiveness to market demands. This finding aligns with existing literature that links strategic sourcing to improved supply chain resilience, environmental stewardship and competitiveness in regulated industries like pharmaceuticals (Charles & Ochieng, 2023; Schiele, 2019). In resource-constrained contexts such as Nasarawa State, where procurement inefficiencies and supplier fragmentation are common, strategic sourcing provides a clear pathway to achieving supply stability and sustainable growth.

Similarly, the observed effect of inventory management reinforces the value of optimized stock control in promoting sustainability. Inventory practices such as demand-driven inventory management (DDIM), economic order quantity (EOQ) and supply chain inventory optimization (SCIO) help enterprises minimize waste, avoid stockouts or overstocking and maintain timely product availability. These outcomes are particularly important in the pharmaceutical sector, where product shelf life, regulatory compliance and customer service are critical. This supports previous



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research which emphasizes that effective inventory control contributes to cost reduction, operational flexibility and environmental sustainability (Mohamed et al., 2024; Song et al., 2020).

Together, the results suggest that strategic sourcing and inventory management are not simply logistical functions but strategic drivers of sustainable performance. Their integration enables pharmaceutical enterprises to improve supply chain efficiency, reduce ecological impact and build long-term resilience. However, the findings also imply that other variables such as digital capabilities, regulatory environments, or firm-level strategic orientation, may influence how these practices translate into sustainability outcomes. This points to the need for further research that examines the interaction between internal operational practices and external institutional factors in shaping enterprise sustainability in emerging market settings.

### **Conclusion and Recommendations**

This study has examined the effect of strategic sourcing and inventory management on the sustainable performance of pharmaceutical enterprises in Nasarawa State. Drawing on a sound conceptual framework and empirical evidence, the research affirms that both constructs significantly and positively influence sustainability across economic, social and environmental dimensions. Strategic sourcing emerged as a key enabler of sustainability by optimizing supplier networks, improving product quality and mitigating supply chain risks. Inventory management, on the other hand, was found to strengthen operational resilience by reducing stock imbalances, preventing waste and ensuring continuous product availability.

The integration of these practices addresses pressing challenges within Nasarawa State's pharmaceutical sector, including weak supply chain coordination, regulatory pressures and resource inefficiencies. By embedding sustainability into procurement and inventory systems, firms are better positioned to achieve long-term viability, regulatory compliance and stakeholder satisfaction. Importantly, this study contributes to the limited body of empirical research on supply chain sustainability in emerging markets, particularly within Nigeria. It demonstrates that effective supply chain practices are not merely operational tools but strategic levers for sustainable enterprise development.

In light of the findings, the study recommends that owners and managers of pharmaceutical enterprises should adopt integrated and data-driven sourcing strategies that prioritize environmental, social and governance (ESG) criteria alongside traditional cost and quality metrics. Additionally, firms should invest in advanced inventory management systems, such as demand-driven inventory models and real-time analytics, to align stock levels with market dynamics and reduce losses from obsolescence.



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