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Perceived Awareness, Knowledge, and Adoption of Supply Chain Principles among Pharmaceutical Manufacturing Professionals: Self-Reported Impacts on Key Performance Indicators, Southeast, Nigeria

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Abstract

The sound production and distribution of essential medicines, from producers to distributors, retailers, and ultimately to end-users, depend on the effective and efficient application of supply chain principles. This research assessed the awareness, adoption, and impact of supply chain principles on supply chain performance in the pharmaceutical manufacturing industries of Southeastern Nigeria. A cross-sectional descriptive survey approach was adopted. Randomly selected sixty-four (64) respondents from thirty-seven pharmaceutical industries that are registered with the Pharmacy Council of Nigeria at the time of the study, with one or two product lines, were used. Data was collected using a well-designed and validated questionnaire in an interviewer-administered approach. The collected data were descriptively analysed using SPSS (version 20). The results showed that the perceived awareness of supply chain principles among pharmaceutical manufacturing industries in the southeast was moderate (50.8%), while the knowledge of these principles was notably high (71.4%). Furthermore, the findings revealed a low adoption rate of modern supply chain principles (44.4%). However, where these principles were implemented, they demonstrated a significant positive impact (mean score: 3.77 ± 0.87) on key performance indicators, particularly in enhancing customer satisfaction and improving overall operational efficiency. Economic and financial barriers, as well as organisational and management issues, were identified as the major hindrances to the adoption of supply chain principles. There is a need for pharmaceutical manufacturing industries in the Southeast to prioritise workforce training with practical applications that enhance supply chain processes during budgeting.

Keywords: *Perceived-Awareness, Knowledge, Adoption, Supply Chain Principles, Performance, Pharmaceutical Manufacturing Professionals.*

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1.0 INTRODUCTION

Supply chain management (SCM), is the centralized management of the flow of goods and services to and from a company and includes all of the processes involved in transforming raw materials and components into final products *(Fernando, 2024*). The business of supply chain management involves many stakeholders, including business units, vendors, suppliers, truckers, warehouses. According to *Mehrhoff (2022),* successful supply chain management can be achieved through the implementation of best practices in all segments of the chain including, planning, sourcing, production, and distribution with proper integration of supply chain principles which forms the fundamental guidelines that govern the design, operation, and management of a supply chain. These supply chain management principles provide a robust framework for improving supply chain operations, ensuring cost efficiency, and enhancing customer satisfaction.

These principles involve various aspects of the supply chain systems, such as demand forecasting, risk management, collaboration, inventory management, logistics, cost reduction, customer satisfaction, customer segmentation, reverse supply chain, strengthened supplier relationships, technology and automation, visibility, continuous monitoring and improvement, supply chain performance, and sourcing (*Handfield, 2018*).

According to *Anderson et al.* (*1997*), these principles are consolidated into seven key supply chain principles. The first principle emphasizes adapting supply chains based on the specific needs of each customer segment to ensure tailored and effective service delivery. The second focuses on designing and customizing logistics networks that meet the service requirements and profitability of each customer segment. The third principle ensures consistent demand forecasting and planning across the supply chain, promoting efficiency and reliability. The fourth and fifth principles, respectively, involve postponing product differentiation until closer to the customer and strategic management of sources of supply to reduce the total cost of owing materials and services.

These two principles enhance responsiveness and reduce unnecessary inventory levels while maintaining quality and efficiency. Whereas the sixth principles advocates for the use of advanced information technology systems that support multi-level decision making, fostering better coordination and visibility, the seventh principle involves adopting channel-spanning performance metrics to gauge collective success of supply chain partners in reaching the end-user effectively and efficiently.

Although adopting supply chain management and its principles has been proven to deliver substantial benefits, such as improved customer satisfaction and increased competitiveness, most African companies face significant challenges in achieving supply chain integration. These challenges include limited infrastructure, regulatory hurdles, and poor adoption of technology, all of which contribute to poor supply chain practices *(Okoduwa et al, 2024)*.

Globally, the average level of supply chain digitalization has been valued at approximately 43%, whereas Africa lags significantly with a digitalization level of less than 10% (*Tabansi, 2024*). Embracing technology and other supply chain management practices is crucial for successfully adopting supply chain principles. Lack of understanding and adoption of supply chain principles not only limits operational efficiency but also affects the timely availability of essential medicines, thereby impacting public health outcomes. This study aims to assess the awareness, adoption, and impact of supply chain principles on supply chain performance in pharmaceutical manufacturing and marketing industries in Southeast Nigeria, identifying key barriers and opportunities for improvement.

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2.0 METHODOLOGY

2.1 Study Design

The study was a cross-sectional descriptive survey that used a structured questionnaire to evaluate perceived awareness, adoption, and impact of supply chain principles on supply chain performance in pharmaceutical manufacturing industries in southeast, Nigeria.

2.2 Study Area

The study was carried out in pharmaceutical manufacturing industries in the four south-eastern states of Nigeria including, Anambra, Enugu, Imo, and Abia States in Southeast. All the pharmaceutical manufacturing industries registered with the Pharmacy Council of Nigeria (PCN) in these states were considered for this research work. Number of registered pharmaceutical manufacturing industries was obtained from each of the state offices of PCN in each of the four eastern states. Twelve, Eleven, six and eight registered pharmaceutical industries participated in the study in Enugu, Anambra, Imo, and Abia States respectively. Ebonyi State was not part of the study because there was no pharmaceutical manufacturing industry in the state at the time of this study, according to the PCN state office, Ebonyi State.

2.3 Study Population and Study Sites

The study population consisted of sixty-four (64) respondents, drawn from specific professional within the pharmaceutical companies; including supply chain managers, operations managers, quality assurance managers, and regulatory affairs managers. These categories were deliberately selected based on their prior professional exposure and expertise in supply chain management and related functions within their respective organizations. Respondents were selected from each company based on the availability of the designated roles. The distribution of respondents across the states was as follows: 20 participants from Anambra State, 24 from Enugu State, 8 from Imo State, and 12 from Abia State.

2.4 Study sample and Sample size determination

At the time of this study, there were sixty-one registered pharmaceutical manufacturing industries in the southeast of Nigeria, according to data obtained from the respective state offices of the Pharmacy Council of Nigeria. However, only thirty-seven pharmaceutical manufacturing industries gave their consent to the study, with sixty-four respondents participating as previously described.

2.5 Data collection instrument

A self-administered questionnaire was developed by reviewing relevant documents and publications *(Okoduwa et al., 2024, and Olapoju, 2019)*. The instrument underwent face and content validation by three experts in supply chain management. It was pilot-tested on a smaller sample of industries in Delta State which is a neighbouring state to the eastern states. The questionnaire consisted of 38 items divided into seven sections. The first section collected demographic and background information of the respondents.

The second section assessed respondents' awareness of supply chain principles, while the third section evaluated their knowledge of these principles. The fourth section examined the perceived level of understanding of various supply chain principles, and the fifth section captured data on the adoption of supply chain practices. The sixth section assessed the impact of these practices on supply chain performance, and the seventh section allowed respondents to include additional comments.

2.6 Ethical Consideration

Ethical clearance, document number COOUTH/HREC/ETH.C/VOL1/FN:04/390, was obtained from the Ethics Board of Chukwuemeka Odumegwu Ojukwu University Teaching

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Hospital, Amaku. Furthermore, informed consent was obtained from each respondent, and no personal identifiers were used to ensure anonymity.

2.7 Data Entry and Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS, version 20). Frequency, percentages, means, and standard deviations were used to present the results. For perceived awareness of the supply chain, responses were coded "1" and "0" for "yes and "no," respectively, and presented in percentages. The total percentage of "yes" formed the level of awareness. A 4-point Likert scale, coded 1 to 4 for "not a priority," "somewhat of a priority," "high priority," and "no priority," respectively, was used to show the level of prioritization of supply chain principles. The total response of "somewhat of a priority" and "high priority" was calculated and converted to a percentage to depict the level of prioritisation and investment in supply chain principles.

For perceived knowledge of supply chain principles and components, a 5-point Likert scale was used, coded 1 (very low), 2 (low), 3 (moderate), 4 (high), and 5 (very high). Mean responses were calculated for each item, and a grand mean was determined. The mean values were computed against the highest scale point (5) and converted to percentage values to represent the level of perceived knowledge of supply chain principles and the knowledge of their components.

For variations in location, the mean value of the responses was calculated. Additionally, the mean values were cross-tabulated by location to obtain the mean value for each location. Then, mean values were computed against the highest scale point (5) and converted to percentage values to represent the level of perceived knowledge of supply chain principles. A similar computation was carried out for location variation in the knowledge of components of supply chain principles. The level of prioritization was determined by computing the total.

For adoption of supply chain principles, a 3-point Likert scale (1 for "yes," 2 for "no," and 3 for "in the process") was adopted for responses to item 1 in section 4 of the questionnaire. The level of adoption was determined by computing the percentage of "yes" against the total responses. Items 1 to 13 of section 5 of the questionnaire were used to determine the impact of supply chain on the company's performance indicators. They were coded "1" (very low impact), "2" (low impact), "3" (moderate impact), "4" (high impact), and "5" (very high impact). Mean values were interpreted in comparison to the coding scale for each item. The grand mean was computed to determine the general impact of supply chain on performance indicators in pharmaceutical manufacturing companies.

4.0 DISCUSSIONS AND RESULT

4.1 Demographic Classification of Pharmaceutical Industries

A total of sixty-four (64) respondents from thirty-seven pharmaceutical manufacturing industries, in the southeast geopolitical zone were surveyed with the majority of them in Enugu (37.5%) and Anambra (31.3%). The demographic classification of the respondent (Table 1) showed that majority of the respondents were either operations managers (32.8%) or quality assurance manager (20.3%), with very few (3.1%) having less than 1 year experience. Approximately two-thirds (66.7%) of the surveyed companies have been in operation for 16 years or more, and most of them (64.5%) operate 13 or more production lines.

Table1. Demographic Details

Item no.	Items	Category	Frequency	Percentage
1	**Respondents' location**	Imo	8	12.5
		Abia	12	18.8

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		Anambra	20	31.3
		Enugu	24	37.5
		Total	**64**	**100.0**
2	**Position of Respondents**	Executive/Leadership	7	10.9
		Supply Chain Manager	10	15.6
		Operations Manager	21	32.8
		Quality Assurance Manager	13	20.3
		Regulatory Affairs Manager	4	6.3
		Quality control Analyst	4	6.3
		Storage manager	4	6.3
		Material officer	1	1.6
		Total	**64**	**100.0**
3	**Years of Experience in the Pharmaceutical Industry**	< 1 year	2	3.1
		1-5 years	12	18.8
		6-10 years	17	26.6
		11-15 years	14	21.9
		16 years or more	19	29.7
		Total	**64**	**100.0**
4	**Age of company**	< 1 year	0	0.0
		1 – 5 years	0	0.0
		6-10 years	6	9.5
		11-15 years	15	23.8
		16 years or more	42	66.7
		Total	**63**	**100.0**
5	**Number of production line**	1 to 3	8	12.9
		5 to 6	5	8.1
		7 to 9	5	8.1
		10 to 12	4	6.5
		13 or more	40	64.5
		Total	**62**	**100.0**

NB: The N (total) respondents varied for each questions due to omissions from respondents as seen in items 4 and 5.

4.2 Perceived Awareness of Supply Chain Principles

On perceived awareness among southeast pharmaceutical industry workers, there is an average (50.8%) level of awareness of supply chain principles with 100% having undergone training on the supply chain principles. The training topics included current good manufacturing practice (13.6%), and core supply chain management (56.8%). However, only 79.2% indicated that their companies prioritize and invest in trainings on supply chain principles. In Abia, all the respondents are perceived to be aware of supply chain principles, with 100% levels of prioritization and investment in supply chain principles, as seen in tables 2 and 3.

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Table 2. Level of perceived awareness of supply chain principles among southeast pharmacological industry workers

Variable		Responses				
		Imo	**Abia**	**Anambra**	**Enugu**	**Southeast**
Aware of supply chain principles	Yes	2 (25.0%)	12 (100%)	7 (36.8%)	11 (45.8%)	32 **(50.8%)**
	No	6 (75.0%)	0 (0%)	12 (63.2%)	13 (54.2%)	31 (49.2%)
	Total	**8**	**12**	**19**	**24**	**63**

Table 3. Respondents' training details and Prioritization of Supply Chain principles

Variable	Category	Responses				
		Imo	**Abia**	**Anambra**	**Enugu**	**Total**
Training on supply chain principles	Yes	2(25.0%)	12(100.0%)	7(36.8%)	11(45.8%)	**32**(50.8%)
	No	6(75.0%)	0(0.0%)	12(63.2%)	13(54.2%)	**31**(49.2%)
Type of training	Current good manufacturing practice	-	3(15.8%)	2(22.2%)	1(6.7%)	**6**(13.6%)
	Inventory management	-	3(15.8%)	2(22.2%)	5(33.3%)	**10**(22.7%)
	Safety management	-	1(5.3%)	1(11.1%)	1(6.7%)	**3**(6.8%)
	Core supply chain management	1(100.0%)	12(63.2%)	4(44.4%)	8(53.3%)	**25**(56.8%)
Prioritization of supply chain	Not a priority	1(16.7%)	0(0.0%)	2(12.5%)	1(5.0%)	**4**(7.5%)
	Somewhat of a priority	1(16.7%)	1(9.1%)	4(25.0%)	6(30.0%)	**12(22.6%)**
	High priority	4(66.7%)	10(90.9%)	7(43.8%)	9(45.0%)	**30(56.6%)**
	Not sure	0(0.0%)	0(0.0%)	3(18.8%)	4(20.0%)	**7**(13.2%)

NB: Above is an open ended response representation of supply chain training details undergone by respondents

4.3 Perceived Knowledge of Supply Chain Principles

Generally, there is 71.4% knowledge level of supply chain component principles among pharmaceutical industry workers surveyed in the south eastern part of Nigeria. The knowledge level on supply chain component principles in Abia State is recorded as highest at 83.1%, while Imo State had the lowest at 67.9%, as seen in Figure 1.

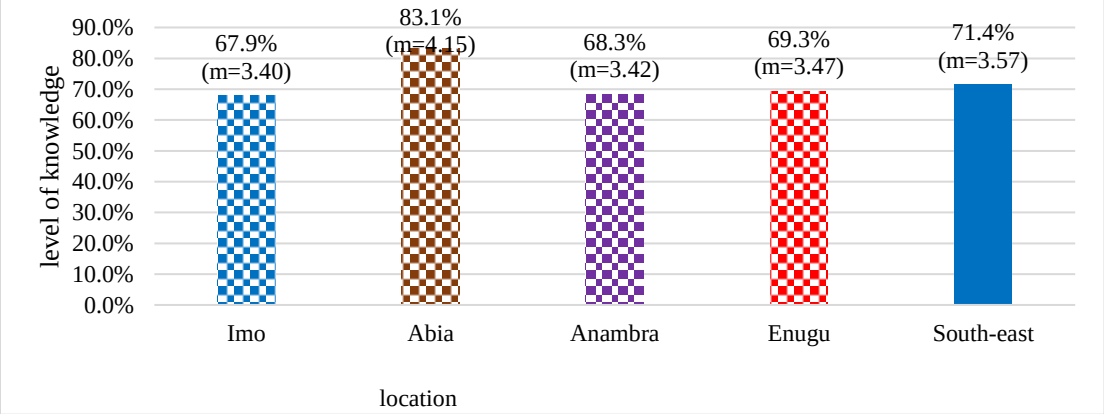

Fig. 1 Perceived knowledge on supply chain principles in South-eastern Nigeria

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Table 4. Perceived knowledge level of supply chain principles in southeast pharmaceutical industry

How would you rate your knowledge and understanding of supply chain principles?	Very Low	Low	Moderate	High	Very High	Mean	Level (%)
1.Overall understanding of supply chain principles relevant to the pharmaceutical industry	1	4	23	29	7	3.58	71.6
2 Confidence in utilizing general supply chain concepts in your position within the pharmaceutical industry	1	5	22	20	8	3.59	71.8
3.Versed in the core principles that enhance the efficiency and effectiveness of pharmaceutical supply chains	2	12	22	20		3.31	66.2
4.Degree to which knowledge of supply chain principles aligns with the specific needs of the pharmaceutical industry	-	5	31	16	12	3.55	71
5.Degree to which knowledge of supply chain principles aligns with the challenges of the pharmaceutical industry	-	6	21	27	9	3.62	72.4
6.Extent to which comprehension of supply chain principles enhances the effectiveness of the pharmaceutical industry's overall supply chain	-	3	20	31	10	3.75	74.4
				Grand mean		**3.57**	**71.4%**

Means were computed against highest scale point (5) for level of perceived awareness of supply chain principles

Table 5. Perceived knowledge level of supply chain principles in southeast pharmaceutical industry

Variable		Responses				
		Imo	**Abia**	**Anambra**	**Enugu**	**Southeast**
knowledge of supply chain principles	Mean	3.40	4.15	3.42	3.47	**3.57**
	Level (%)	67.9	83.1	68.3	69.3	**71.4**

Means were computed against highest scale point (5) for perceived level of knowledge of supply chain principles

Table 6 Level of understanding of components of supply chain principles

How would you rate your knowledge and understanding of supply chain principles?	Very Low	Low	Moderate	High	Very High	Mean	Level (%)
1.Understanding of Lean Management principles relevant to the pharmaceutical industry	3	13	19	18	11	3.33	66.6
2 Confidence in applying Demand Forecasting concepts in your role within the pharmaceutical industry	2	6	21	27	7	3.49	69.8
3.Familiaritywith the strategies involved in Inventory Optimization within pharmaceutical supply chains	4	7	19	20	14	3.52	70.4
4.Knowledge of Risk Management principles aligns with the specific needs and challenges of the pharmaceutical industry	-	7	18	25	14	3.72	74.4

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5.Understanding of Technology and Automation contributes to the success of the overall supply chain in the pharmaceutical industry	-	7	18	22	17	3.77	75.4
6.Knowledge about the principles of Sustainability as they apply to pharmaceutical supply chain	1	5	23	19	15	3.67	73.4
7. Comprehension of the integration of Quality Assurance principles within the supply chain	-	5	9	28	22	4.05	81.0
8. Familiarity with the principles of Regulatory Compliance in the context of pharmaceutical manufacturing/marketing	-	4	14	25	21	3.98	79.6
				Grand mean		**3.69**	**73.8%**

Means were computed against highest scale point (5) and converted to %for level of understanding of supply chain components

Table 7. Level of understanding of components of supply chain principles

Variable		**Responses**				
		Imo	**Abia**	**Anambra**	**Enugu**	**Southeast**
knowledge of supply chain principles	Mean	3.35	4.26	3.61	3.47	**3.69**
	Level (%)	67.0	85.2	72.2	69.4	**73.8**

Means were computed against highest scale point (5) and converted to %for level of understanding of supply chain components

Table 8. Level of adoption of Supply Chain Principles by Pharmaceutical Industries

Variable		**Responses**				
		Imo	**Abia**	**Anambra**	**Enugu**	**Southeast**
Aware of supply chain principles	Yes	1 (14.3%)	10(83.3%)	7 (35.0%)	10(41.7%)	28**(44.4%)**
	No	1 (14.3%)	0 (0%)	4(20.0%)	7(29.2%)	12(19.0%)
	In the process	5 (71.4%)	2 (16.7%)	9 (45.0%)	7 (29.2%)	23 (36.5%)
	Total	**7**	**12**	**20**	**24**	**63**

Table 9 level of implementation of Supply Chain Principles by Pharmaceutical Industries

Level of implementation	**Location of pharmaceutical industry**				**Total**
	Imo	Abia	Anambra	Enugu	
Very low implementation/utilization	0(0.0%)	0 (0.0%)	0 (0.0%)	2(13.3%)	2 (5.7%)
Low implementation/utilization	0 (0.0%)	1(10.0%)	2(28.6%)	0 (0.0%)	3 (8.6%)

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Moderate implementation/utilization	2(66.7%)	1(10.0%)	2(28.6%)	6(40.0%)	11(31.4%)
High implementation/utilization	1(33.3%)	4(40.0%)	3(42.9%)	6(40.0%)	14 (40.0%)
Very high implementation/utilization	0 (0.0%)	4(40.0%)	0 (0.0%)	1 (6.7%)	5 (14.3%)

Table 10 Barriers to understanding or implementing Supply Chain Principles

Category	**Frequency**	**Percentage (%)**
Infrastructure and logistics	7	8.8
Economic and financial barriers	29	36.3
Organizational and management issues	18	22.5
Operational and process barriers	16	20.0
Technological and communication gaps	8	10.0
Market and consumer dynamics	1	1.3
Time and resource constraint	1	1.3
Total response	**80**	**100**

NB; table 10 above is open ended response representation of challenges in adoption of supply chain principles

4.4 Impact of Supply Chain Principles on Performance Indicators

In table 11, the mean scores demonstrate that there is a perceived general high level (3.77± 0.87) of impact of supply chain practices on key performance indicators in pharmaceutical industries in the southeast. Customers' satisfaction (4.03 ± 0.90) and overall operational efficiency (4.02 ± 0.77) were more highly affected. Almost all indicators show high impact except for cost reduction (3.38 ± 0.97), lead time reduction (3.44 ± 1.02) and time-to-market for new products (3.43 ± 0.94), which showed moderate impact.

Table 11 Perceived Understanding of Impact of Supply Chain Principles on Key Performance Indicators

	Very Low Impact	Low Impact	Moderate Impact	High Impact	Very High Impact	Mean	Std. Dev	Value
1.Cost Reduction	2	8	25	20	8	**3.38**	0.97	**Moderate**
2.Lead Time Reduction	3	8	17	28	7	**3.44**	1.02	**Moderate**
3.Improved Product Availability	1	1	21	25	12	**3.77**	0.85	**High**
4.Product Quality	1	1	18	24	17	**3.90**	0.89	**High**
5.Customer Satisfaction	1	1	14	23	21	**4.03**	0.90	**High**
6.On-time Delivery	1	2	12	34	11	**3.87**	0.81	**High**
7.Supplier Performance	5	18	28	11	62	**3.73**	0.85	**High**
8.Cost of Goods Sold (COGS)	1	3	24	25	6	**3.54**	0.82	**High**

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9.Return on Investment (ROI)	-	5	23	26	5	**3.53**	0.77	**High**
10.Time-to-Market for New Products	2	6	21	23	6	**3.43**	0.94	**Moderate**
11.Compliance with Regulatory Requirements	4	11	30	17	62	**3.97**	0.85	**High**
12.Inventory Turnover	-	4	16	28	10	**3.76**	0.82	**High**
13.Overall operational efficiency	-	2	11	31	16	**4.02**	0.77	**High**
		Grand mean				**3.77**	**0.87**	**HIGH**

NB: Mean scores values are interpreted in lieu of the response code 1 – 5 from very low to very high impact

Abia State, recorded highest level of impact (4.11 ± 0.54) of supply chain principles on key performance indicators, while Imo State recorded the least level of impact at (3.6 ± 0.38) (Figure 2).

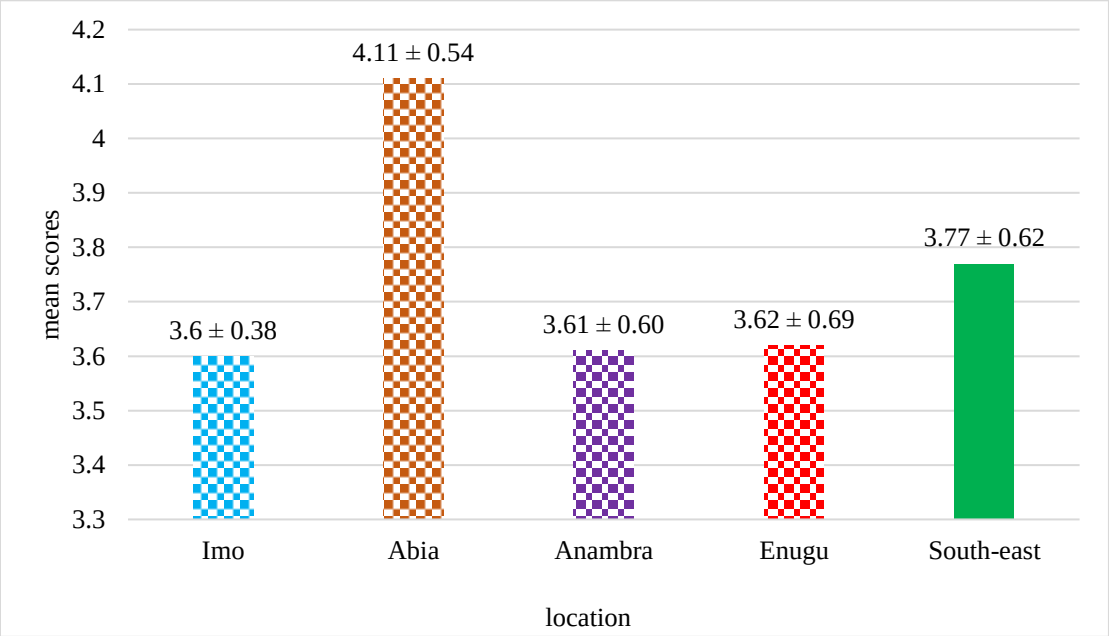

Figure 2 Location variations in the level of impact of Supply Chain Principles by on key performance indicators

4.5 Discussion

There is an average level (50.8%) of awareness of supply chain principles among the pharmaceutical manufacturing industries surveyed in this study, leaving the other remarkable half unaware. This awareness level is lower compared to the 70.7% level of awareness reported by *Chukwu et al. (2017),* while investigating supply chain management of health commodities for reducing global disease burden in Nigeria.

However, in this research, pharmaceutical companies in Abia State showed very high levels of awareness and prioritization of supply chain principles compared to those in other states in the Southeast. Specific reports *(Uko, 2024)* have suggested that the recent industrial transformation in Abia State is crucial to the operations of businesses in the state and, consequently, their supply chains. The awareness of supply chain management in this study is shown to be contingent upon training or education, primarily focusing on core supply chain

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management, current good manufacturing practice, inventory management, and safety management.

The level of knowledge of components of supply chain principles among respondents in this survey is 71.4%. This may be attributable to the fact that respondents major training is on core supply chain management. Although this level is corroborated by *Buseri et al. (2023)*, who also recorded a good understanding of supply chain principles in the south-southern part of Nigeria in the management of pharmaceuticals, in contrast, the knowledge strength in components of the supply chain is highest in customer service and product selection. In this survey, however, state variation revealed that Abia State recorded the highest level of knowledge of supply chain principles. This could be tied to their high level of awareness and exposure vis-à-vis education on supply chain principles.

The result also showed that the level of adoption of supply chain practices in the south-eastern pharmaceutical industry is low (44.4%), with some of the industries being in the process of adopting the principles while less than half (40%) of the industries are operating the principles at high levels. This value is not too far from the awareness level of 50.8% observed in this study and may therefore play a significant role in adoption. Our findings showed that economic and financial barriers/organizational and management issues are the significant barriers hindering the adoption of supply chain in south-eastern pharmaceutical industries. In line with that, *Chukwu et al. (2018),* reported that inadequate monitoring and lack of set standards by drug companies affect supply chain practices. However, the adoption rate is as high as 83.3% in Abia State, with 16.7% of the industries being in the process of adopting supply chain principles. This as well may be tied to the high level of knowledge and awareness demonstrated by pharmaceutical industries in the state, as shown in the result.

Furthermore, the overall impact of supply chain principles, on performance indicators in the companies that have adopted it is high. The impact is mainly felt in customers' satisfaction and overall operational efficiency. According to *Okafor et al. (2018),* the Southeast is widely recognised as a business and trade hub; manufacturing companies have significantly improved their customer relations following the adoption of certain principles. This is in line with the findings of *Buseri et al. (2023),* which suggested that pharmaceutical companies are highly knowledgeable in customer servicing, which is intended to bring satisfaction to them. Moreover, among the states surveyed, pharmaceutical industries in Abia State also reported a high impact of supply chain principles on their performance which is consistent with their high priority level and awareness.

Moreover, we encountered some challenges during our data collection process. Some of the companies we visited declined to participate in our study, refusing to grant us access to share questionnaire with them. The reasons behind their decision were not disclosed to us.
Another challenge we faced was building trust and cooperation with potential participant companies. In some cases, it took multiple visits and discussions before these companies were convinced to work with us. This process not only consumed a significant amount of time but also required considerable effort to establish rapport and demonstrate the value of our research.

5.0 CONCLUSION

The research highlighted the importance of effective supply chain management in enhancing operational efficiency and customer satisfaction within the pharmaceutical industry. Economic and financial barriers, as well as organisational and management issues are the significant barriers affecting the implementation of supply chain principles in southeastern pharmaceutical manufacturing industries. There is a need for pharmaceutical manufacturing industries in the southeast to prioritize workforce training and funding for enhancing supply chain processes during budgeting. Also, key staff should be encouraged to enrol in supply chain management programs and continue their education.

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The authors show no conflict of interest in this research.

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9.0 AUTHOR CONTRIBUTIONS
EJC, SON, and KGN designed the study. EJC and JON were responsible for data collection. EJC, IJN, and SON analyzed and interpreted the data. EJC, SON, IJN, JON, and KGN drafted the manuscript. All authors reviewed and approved the manuscript.

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