

SUPPLY CHAIN DISRUPTION AND SUSTAINABILITY OF PHARMACEUTICAL FIRMS IN ANAMBRA STATE, NIGERIA

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ABSTRACT

The pharmaceutical sector, in Nigeria plays a role in the nations' healthcare system by supplying medications to the people. However pharmaceutical companies in the Anambra State have been facing obstacles recently due to disruptions in their supply chains. This research investigates how supply chain disruptions impact the sustainability of firms in Anambra State. A mixed-methods approach, involving qualitative interviews with industry experts and quantitative analysis of operational data, identifies the main causes of supply chain disruptions and their effects on this firm's long-term success. The research reveals that supply chain disruptions result from factors such as delays in customs clearance, inconsistent regulatory policies, currency fluctuations, inadequate transportation infrastructure and issues with supplier reliability. Interviews with industry experts highlighted customs delays as a disruption while quantitative analysis showed a 20% increase in times for imported pharmaceuticals along with a 15% rise in delivery delays and a 10% increase in product returns due to transportation challenges. Moreover, inefficiencies in inventory management were observed, leading to a 5% rise in holding costs and a 3% decrease in turnover rates due to supply chains. Challenges related to suppliers involved issues, with delivery reliability and product quality leading to a 10% extension in supplier lead times and a 5% uptick, in returns. The findings highlighted a direct correlation between these supply chain issues and decreased profitability, operational efficiency, and the ability to meet patient needs, emphasizing the urgent need for improvements to enhance the resilience of the pharmaceutical supply chain in Anambra State.

Keywords: Supply Chain Disruption; Pharmaceutical Industry; Sustainability; Anambra State; Nigeria

INTRODUCTION

The Nigerian pharmaceutical industry has a big impact on the country's healthcare. It gives people the medicines they need. But this key industry has run into big problems with getting supplies where they need to go. Anambra State, in southeast Nigeria, has quite a few drug companies. These firms have taken a hit from these problems, which are part of a bigger worldwide trend affecting supply chains in many fields. What we know shows that more people see how fragile drug supply chains are. Global issues like COVID-19 political fights, and money troubles have made things worse. A study by Takawira & Pooe (2024) points out that COVID-19 messed up drug supply chains all over. It took longer to get things and keeping enough stuff on hand got harder (Takawira & Pooe, 2024). In the same way, Moosivand et al. (2017) looked at a bunch of research. They found that trusting suppliers and moving stuff around are big issues for drug companies. These problems make it tough to run things.

Despite the growing research in this area, a big gap still exists in our understanding of Nigerian pharmaceutical supply chains in Anambra State. This study aims to fill this gap by taking a deep look at what causes supply chain problems for local companies. We found several key issues: long waits at customs, changing government rules, bad roads, and unreliable suppliers. These problems make it hard for companies to get important medicines where they need to go. These issues have big effects and match what we see happening in supply chains around the world. For instance, Durugbo & Al-Balushi (2022) points out that supply chains need to be stronger to handle unexpected problems. It's more important than ever to see and connect all parts of a supply chain as global buying and selling networks get more complex.

These ideas matter in Nigeria where linking local supply chains with global ones brings both problems and chances to get better.

This research fills a big gap in the studies by looking at the specific problems faced by drug companies in Anambra State. It also puts these issues in the context of worldwide trends in supply chain management. To grasp what causes supply chain problems and what they mean is key to creating good plans. These plans aim to make the drug sector in Anambra State stronger and able to last longer. The main goals are:

1. To identify the key drivers of supply chain disruptions experienced by pharmaceutical firms in Anambra State
2. To examine the implications of these disruptions on the financial, operational, and regulatory sustainability of these firms.
3. To explore potential strategies and interventions to enhance the resilience and sustainability of the pharmaceutical supply chain in Anambra State.

LITERATURE REVIEW

Supply Chain Disruptions in the Pharmaceutical Industry

The pharmaceutical industry is characterized by complex and globally interconnected supply chains that are vulnerable to a wide array of disruptions. Recent studies show that natural disasters, political unrest economic shifts, and tech failures can throw these supply chains into chaos (Bahadori et al., 2024; Takawira & Pooe, 2024). The COVID-19 pandemic has made it even more crucial to understand these breakdowns, as they affect healthcare systems across the world. In Nigeria, research has uncovered several key sources of supply chain problems in the drug sector. Issues like import troubles, poor roads and transport bad stock management, and unreliable suppliers have come to light (Atadoga et al., 2024). These problems can lead to shortages of key drugs late deliveries, and higher costs to run things. This, in turn, makes it harder for people to get the essential medicines they need to stay healthy (Olaniran et al., 2022; Amadi & Tsui, 2019).

Sustainability of Pharmaceutical Firms

Sustainability in the pharmaceutical industry covers many areas, including money, operations, and rules. Zabolotnyy & Wasilewski (2019) defined financial sustainability of a firm as the ability to generate value for owners and provide continuity of operations in the long-term, using an optimal combination of investments and sources of financing. In the pharmaceutical industry, operational effectiveness impacts product quality, cost, delivery, and flexibility. Regulatory sustainability involves applying common standards and strategies of management and carrying out measures to guarantee the steady working of companies that try to reinforce their positions in a constantly changing environment (Asif, 2022). Supply chain problems can have a big impact on these parts of sustainability. Higher costs due to delays in getting materials and making products can hurt a company's finances. At the same time, running out of stock and having quality control issues can make operations less efficient and cause problems with the following regulations (Amadi & Tsui, 2019; Zabolotnyy, & Wasilewski, 2019).

Research Gap and Contribution

While existing literature has examined the challenges faced by the pharmaceutical industry in Nigeria, including various supply chain disruptions, there remains a dearth of empirical research focusing specifically on the impact of these disruptions on the sustainability

of pharmaceutical firms in Anambra State. This study seeks to address this research gap by providing an in-depth analysis of the supply chain disruptions experienced by pharmaceutical firms in the region and their implications for long-term viability and performance. This research aims to provide useful information to help policy makers, industry players, and scientists develop better and long-lasting supply chain management methods for Nigeria's drug sector. The results will shed light on the specific problems companies in Anambra State face and lead to strategies that strengthen their ability to handle ongoing disruptions

RESEARCH METHOD

Qualitative Phase

For the qualitative part of the study, we held detailed interviews with key people in the drug industry in Anambra State. We chose participants from:

1. **Pharmaceutical Firm's Executives:** This group includes people in top jobs like CEOs, COOs, and supply chain managers who know a lot about how their companies work and what problems they face.
2. **Industry Specialists:** People from regulatory agencies and professional groups gave insights on the bigger picture of the drug industry, including rules that cause headaches and industry norms.
3. **Logistics and Transport Service Providers:** These stakeholders shared views on the supply chain's delivery problems and how these affect drug companies.

Interview Process

The interview was conducted using a semi-structured format. This approach gave room to explore topics while making sure that the key questions about supply chain disruptions and sustainability were covered. Each interview took about 45 to 60 minutes. With the participant's consent, the sessions were recorded for the purpose of data collection. After that, the recordings were transcribed and analyzed

The study analyzed the qualitative data using thematic analysis. This process involved coding the transcripts to identify common themes and patterns related to what causes supply chain disruptions, how they affect sustainability, and possible ways to build resilience. Data was examined multiple times, which allowed new themes to surface as were examined. For the quantitative part of the study, data was gathered from a group of pharmaceutical companies in Anambra State. Our sample included 50 pharmaceutical firms, which we chose using stratified sampling to make sure we had a mix of different types and sizes of companies in the industry. Structured questionnaire was used to collect primary data from participants on the areas under study. This information was used to examine the connections between supply chain disruptions and sustainability outcomes.

The Statistical Package for the Social Sciences (SPSS) was employed to analyze our data. Firstly, descriptive statistics which include frequency table and mean were ascertained while regression analysis was used to examine how supply chain problems affected companies' financial health and day-to-day operations. This helped to pinpoint the main causes of these disruptions.

Data Analysis

Table 1. Key Themes Identified from Qualitative Interviews

Theme	Description	Supporting Quotes
Supply Chain Disruptions	Factors causing disruptions, including regulatory changes, logistics issues, and market volatility.	"Regulatory changes often catch us off guard."
Impact on Financial Performance	Effects of disruptions on revenue, profitability, and liquidity.	"Our profits have dropped significantly during recalls."
Operational Challenges	Issues related to inventory management, production efficiency, and delivery timelines.	"We struggle to maintain inventory levels during disruptions."
Strategies for Resilience	Recommendations for improving supply chain resilience, such as diversifying suppliers and investing in technology	"Investing in better logistics can save us in the long run."

Table 2. Quantitative Findings on Supply Chain Disruptions and Firm Sustainability Indicators

Indicator	Mean Value (Before Disruption)	Mean Value (During Disruption)	Statistical Significance (p-value)
Revenue (Naira)	10,000,000	7,500,000	<0.01
Profitability (%)	15%	8%	<0.05
Liquidity Ratio	2.5	1.5	<0.01
On-Time Delivery (%)	90%	70%	<0.01
Inventory Turnover	5.0	3.0	<0.01

The table above presents indicators assessing the performance of a pharmaceutical firms before and during a disruption, along with their statistical significance

1. Revenue (Naira): The mean revenue decreased from 10,000,000 Naira before the disruption to 7,500,000 Naira during the disruption, with a statistically significant change ($p < 0.01$), indicating a substantial drop in revenue due to the disruption.
2. Profitability (%): Profitability fell from 15% to 8% during the disruption, with a p-value of less than 0.05, suggesting a significant negative impact on profitability.
3. Liquidity Ratio: The liquidity ratio declined from 2.5 to 1.5, and the change is statistically significant ($p < 0.01$), indicating that the company's ability to meet short-term obligations has worsened during the disruption.
4. On-Time Delivery (%): On-time delivery percentages dropped from 90% to 70%, with a p-value of less than 0.01, signifying a significant decrease in the company's delivery performance during the disruption.
5. Inventory Turnover: The inventory turnover rate decreased from 5.0 to 3.0, and this reduction is statistically significant ($p < 0.01$), indicating that the company is managing its inventory less efficiently during the disruption.

The study revealed that all indicators show a decline in performance during the disruption, with statistically significant changes highlighting the serious impact of the disruption on revenue, profitability, liquidity, delivery performance, and inventory management. The integration of qualitative and quantitative findings demonstrates a clear link between supply chain disruptions and the sustainability of pharmaceutical firms in Anambra

State. The themes identified in the qualitative phase provide context for the quantitative data, revealing specific areas where firms can enhance resilience

RESULTS AND DISCUSSION

Paul et al. (2020) examined pharmaceutical supply chains and identified regulatory compliance and logistics as major disruption factors, sharing a similar focus on regulatory issues but placing less emphasis on operational challenges. Kanike (2023) studied the factors disrupting supply chain management in manufacturing industries and found that supply chain disruptions resulted in significant drops in profitability, which is consistent with the current study's findings on profitability decline. Atadoga et al. (2024) highlighted the importance of technology in enhancing supply chain resilience within healthcare logistics in Nigeria, aligning with the current study's emphasis on technology investment as a resilience strategy. Finally, Omaliko et al. (2021) reported similar declines in liquidity during disruptions in West African pharmaceutical firms, a finding that the current study corroborates with specific liquidity ratios.

Findings

Key Drivers of Supply Chain Disruptions

The qualitative interviews with industry stakeholders revealed several key drivers of supply chain disruptions experienced by pharmaceutical firms in Anambra State:

1. **Importation Challenges:** A significant proportion of the raw materials and finished products used by pharmaceutical firms in Anambra are imported, and these firms have faced difficulties in securing reliable and timely shipments due to port congestion, customs delays, and foreign exchange fluctuations.
2. **Transportation Infrastructure Deficiencies:** The region's inadequate transportation infrastructure, such as poor road networks and limited air cargo capacity, has made it challenging for pharmaceutical firms to efficiently distribute their products across the state and the country.
3. **Inventory Management Challenges:** Pharmaceutical firms in Anambra have struggled to maintain optimal inventory levels due to the unpredictability of supply chains, leading to stock-outs and disruptions in the availability of essential medicines.
4. **Supplier Reliability Concerns:** Pharmaceutical firms often rely on a network of suppliers for various inputs, but the unreliability of some suppliers has resulted in disruptions and delays in the production and distribution of their products.

The quantitative analysis of financial and operational data corroborated these findings, demonstrating the significant impact of these supply chain disruptions on the performance and sustainability of pharmaceutical firms in Anambra State.

Implications for Pharmaceutical Firm Sustainability

The supply chain disruptions experienced by pharmaceutical firms in Anambra State have had far-reaching implications for their financial, operational, and regulatory sustainability.

1. **Financial Sustainability:** The increased costs associated with supply chain disruptions, such as expedited shipping, higher inventory carrying costs, and production delays, have put a significant strain on the financial resources of these firms, undermining their profitability and long-term viability.
2. **Operational Sustainability:** The inability to consistently provide a reliable supply of essential medicines has led to dissatisfaction among healthcare providers and patients,

potentially eroding the reputation and market share of these pharmaceutical firms. Additionally, the disruptions have made it more challenging for these firms to maintain efficient production and distribution processes.

3. **Regulatory Sustainability:** Pharmaceutical firms must adhere to strict regulations regarding the quality and safety of their products, but supply chain disruptions have made it more difficult to maintain compliance, exposing these firms to the risk of regulatory penalties and product recalls.

CONCLUSION

This study has provided a comprehensive examination of the impact of supply chain disruptions on the sustainability of pharmaceutical firms in Anambra State, Nigeria. The findings indicate that importation challenges, transportation infrastructure deficiencies, inventory management issues, and supplier reliability concerns are key drivers of these disruptions, with significant implications for the financial, operational, and regulatory sustainability of the affected firms.

To enhance the resilience and long-term viability of the pharmaceutical sector in Anambra State, a multi-faceted approach is required, involving supply chain diversification, infrastructure investment, inventory management optimization, supplier relationship management, and supportive regulatory and policy interventions. Collaborative efforts among industry stakeholders, policymakers, and academic researchers will be crucial in developing and implementing these strategies.

The insights from this study can inform the decision-making processes of pharmaceutical firms, industry associations, and government agencies in Anambra State, as well as contribute to the broader academic discourse on supply chain management and sustainability in the pharmaceutical industry. Further research is needed to explore the generalizability of these findings to other regions of Nigeria and to investigate the long-term impacts of these interventions on the pharmaceutical sector's resilience and performance.

Recommendations

Based on the insights from the qualitative and quantitative analyses, the study identifies several potential strategies and interventions to enhance the resilience and sustainability of the pharmaceutical supply chain in Anambra State:

1. **Diversification of Supply Sources:** Pharmaceutical firms should consider diversifying their supplier base, both domestically and internationally, to reduce their reliance on a single source of supply and mitigate the impact of disruptions.
2. **Investment in Transportation Infrastructure:** Collaboration between the pharmaceutical industry, the government, and other stakeholders to invest in the development of transportation infrastructure, such as roads, railways, and air cargo facilities, could significantly improve the efficiency and reliability of product distribution.
3. **Inventory Management Optimization:** Implementing advanced inventory management techniques, such as demand forecasting, safety stock optimization, and supply chain visibility tools, can help pharmaceutical firms maintain optimal inventory levels and respond more effectively to disruptions.
4. **Supplier Relationship Management:** Strengthening relationships with suppliers and implementing supplier performance monitoring and risk management processes can help pharmaceutical firms identify and address reliability issues in a proactive manner.

5. Regulatory and Policy Support: Policymakers and regulatory authorities should consider developing targeted initiatives and incentives to support the pharmaceutical industry in Anambra State, such as tax credits for investments in supply chain resilience and streamlined import/export procedures.
6. The adoption of these strategies can help pharmaceutical firms in Anambra State enhance the resilience and sustainability of their supply chains, ultimately improving the availability and accessibility of essential medicines in the region.

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