

INFORMATION SHARING AND SUPPLY CHAIN OPTIMIZATION OF PHARMACEUTICAL PRODUCTS DISTRIBUTORS IN RIVERS STATE, NIGERIA

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Abstract

This study investigated the relationship between information sharing and supply chain optimization of pharmaceutical products distributors in Rivers State. The study was conceptualized using information sharing as predictor to supply chain optimization, measured as cost reduction, product availability and strategic flexibility. The study adopted a survey research design. The population of the study comprised 35 major pharmaceutical products distributors in Rivers State. The sample size of the study was the same as the study population. 2 copies of questionnaire were administered to staff (procurement managers and marketing manager) of each of the 35 pharmaceutical products distributors. This means that a total of 70 respondents provided data for the study. Pearson's Product Moment Correlation was used to test 3 hypotheses formulated for the study, relying on Statistical Packages for Social Sciences Version 23.0. The results of the analyses reveals the existence of significant relationship between information sharing and supply chain optimization of pharmaceutical products distributors in Rivers State. Thus, the study concluded that information sharing significantly relates with supply chain optimization of pharmaceutical products distributors in Rivers State; and recommends that managers of pharmaceutical products distributors should adopt information sharing as a means to enhance their supply chain optimization in terms of cost reduction, increase product availability and strategic flexibility.

Keywords: Cost reduction, information sharing, product availability, strategic flexibility, supply chain optimization

Introduction

Supply chain management (SCM) is an integral part of our daily life. Its influence cuts across a large number of human and economic activities. Several scholars (Xu & He, 2021; Şahin & Topal, 2019; Baba et al., 2021) describe SCM as a competitive strategy that integrates suppliers and customers with the objective of improving responsiveness and flexibility. Ahmed (2022) views supply chain as an integrated system with flow of materials, manufacturing planning and control. Khan et al. (2018) aver that SCM is the integration of key business processes from end user through original suppliers that provide products and information aimed at adding value to customers and other stakeholders (Zhang et al., 2019). Wang and Ramzani (2021) note that the key issue in supply chain is to align objectives and coordinate decisions to optimize supply chain performance.

Every supply chain practice aims to minimize costs while satisfying customer demands. Ideally, in a typical supply chain system, suppliers and customers are conjoined into one collective business process that traverses the entire chain from primary sources to final consumers (Nazifa & Ramachandran, 2019). It implies that every single firm depends on other firms in order to deliver goods or services to customers (Song et al., 2016).

Khan et al. (2018) observe that the dependence of individual firms on others is sustained by information sharing. It is evident that supply chain firms benefit from the practice of information sharing (Huo et al., 2021). Information such as inventory level, promotions, order fulfilment, demand forecast, capacity planning, manufacturing/delivery plan and supply disruptions are crucial for managing supply chains and sharing this information with upstream and downstream

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partners is immensely important (Zhang et al., 2019).

Supply chain partners use information sharing in developing strategies to bring down cost associated with inventory, reduce mismatch between supply and demand, enhance customer satisfaction, reduce paper work and manual labour, and ensure delivery of consistent logistics services (Huo et al., 2016). While there are several studies that indicate the significance of information sharing to improved supply chain optimization (Kilibarda et al., 2016), very few have clearly explained the relationship between them (Baah et al., 2021; Sahin & Topal, 2019; Khan et al. 2018).

In addition, owing to the fact that performance measures have strengths and drawbacks and depends on the aims and objectives of firms, there is no unanimous opinion in past studies, on the best measures of supply chain optimization (Huo et al., 2016). Also, there are limited studies conducted in Rivers State that explain the relationship between information sharing and supply chain optimization. Hence this study aims at addressing this gap by examining the empirical relationship between information sharing and supply chain optimization of pharmaceutical companies in Rivers State.

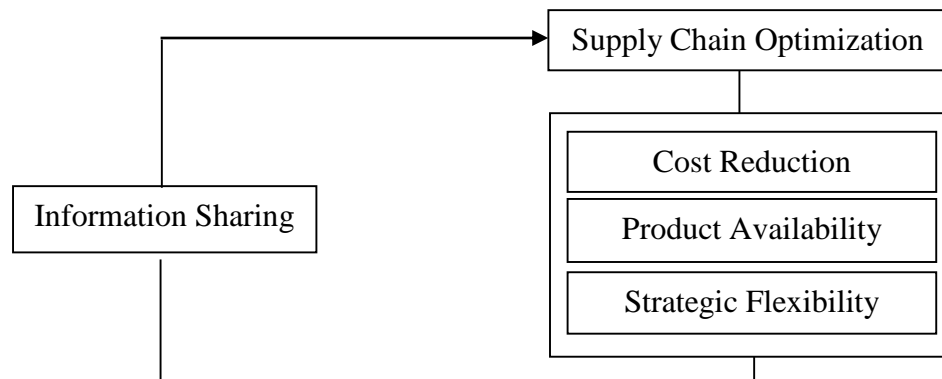


Fig. 1: Conceptual framework of relationship between information sharing and supply chain optimization of pharmaceutical companies in Rivers State.

Source: Topal, B., & Sahin, H. (2018). The influence of information sharing in the supply chain process on business performance: An empirical study. *Studies in Informatics and Control*, 27(2), 203-214.

Baseline Theory: Resource Dependency Theory (RDT)

RDT was developed by Pfeffer and Salancik (1978, as cited in Khan et al., 2018) to guide how to design and manage organizations that are externally constrained (Khan et al., 2018). RDT provides a major orienting perspective for understanding the dependence and relationships between buyers and suppliers (Baah et al., 2021). RDT holds that major suppliers have resource-based power in the form of inputs and capabilities to the extent that such inputs/materials and knowledge are deemed prudent and valuable by buyers (Huo et al., 2016). That is to say, buyers place a high value on suppliers' inputs in order to achieve their performance goals (Baah et al., 2021).

RDT help explains why a company might choose (not) to share information. Information sharing in supply chains involve certain supply chain partners because of resource dependency (Khan et al. 2018). The current study thus argues that, by properly relating with suppliers of focal firms' inputs, firms will leverage on that to drive procurement efficiency with the help of information sharing – a requisite recipe for establishing and sustaining business to business relationships.

Concept of Information Sharing

The existence of information sharing in supply chains and buyer-supplier dealings is critical for success in partnerships and procurement performance. Information sharing facilitates good communication among partners. Information sharing is a systematic and deliberate way of sharing critical and proprietary information with supply chain partners (Abbasi et al., 2020). Baah et al. (2021) define inter-firm information sharing as the sufficiently elaborate, frequent and timely information shared between buyers and key suppliers to meet the needs of a firm. It is an important cooperation component in SCM.

Ateke and Kalu (2016) opined that information sharing is driven by the desire of firms exchange intelligence on consumers with a view to serving them better. By leveraging information sharing arrangements, firms offer advanced services to consumers. Companies scarcely have all it takes to serve customers on their own. So, they leverage to inter-firm collaborations that promote information sharing (Ateke & Kalu, 2016) to shields themselves from crises or market risks.

Thus, it can be assumed that limitations in manpower, infrastructure and technical resources and the desire of firms to gain good market presence is what informs information sharing among collaborating enterprises (Ateke & Simeon, 2017). Jackson (2005) states that firms that pursue long-term survival must resort to information sharing as a strategic posturing to strengthen their market position.

Supply Chain Optimization

A supply chain is a set of firms linked by one or more upward and downward streams of goods and services, cash flow and information. Supply chain optimization is one of the key components of effective management of a company with a complex manufacturing process and distribution network (Aghamohammadzadeh et al., 2020).

According to Carter et al. (2015), supply chain optimization refers to the science and art of designing a comprehensive qualitative and quantitative strategic view of the entire organization's supply chain. Supply chain optimization connects the entire value chain, from R&D and materials sourcing through production and delivery.

Rather than focusing on individual suppliers, it supply chain optimization provides a holistic view to enable the firm to look at the entire system and find ways to improve delivery speed, while reducing costs and risks. The implementation of the supply chain networks to cover this form of management is one the main factors of the success (Gambella et al., 2021).

Supply chain optimization is complex and multi-faceted. Different firms focus on different aspect of supply chain optimization, based on what goals they seek to attain. In this study, we decomposed supply chain optimization into cost reduction, product availability and strategic flexibility.

Cost reduction is a planned approach to reduce expenditure. It is a continuous process of critically examining all elements of cost and each aspect of a business with a view to improving efficiency. It is a corrective function that relates to cutting down costs incurred by an organization for the purpose of making profit. It starts when cost control considers that no cost is at its optimum level. Product availability is the existence and accessibility of products, and related information and service required by consumers to satisfy their needs. Product availability is an important indicator of market performance (Srivastava et al., 2022). Unavailability of products leads to loss of sales

and customers (Soni & Gupta, 2020). Product availability influence consumers' purchases (Srivastava et al., 2022).

Strategic flexibility is defined as an organization's capability to identify major changes in the external environment (e.g., introduction of disruptive technologies), to quickly commit resources to new courses of action in response to change, and to recognize and act promptly when it is time to halt or reverse such resource commitments (Huo et al., 2016).

Information Sharing and Supply Chain Optimization

Research has established that information sharing influence different performance outcomes desired by firms. Lee and Kim (2023) demonstrated that information sharing impacts trust and commitment level in a supply chain. Reenu et al. (2022) established that information sharing plays a key role in enhancing supply chain performance, showing that delivery and flexibility performance of firms is significantly affected by information sharing while cost and quality performance are not affected by information sharing.

Likewise, Ahmed (2022) affirmed that information sharing impact supply chain performance under the mediation of trust. This suggests that information sharing is crucial to improving supply chain performance by impacting supply chain optimization. The implication here is that managers must understand the importance of information sharing to supply chain performance. In Gebisa1 and Ram (2021), it was confirmed that information sharing as part of inventory management practices, strongly influence business performance.

Similarly, Wang and Ramzani (2021) showed that information sharing play important roles in supply chain performance; while Baah et al. (2021) in their study, found that information sharing positively and significantly influence supply chain visibility, collaboration, agility and performance. Relatedly, Huo et al. (2021) examined the impact of information sharing on supply chain learning and flexibility performance. The study found that information sharing plays a key role in enhancing the performance of supply chains. The study confirmed that delivery and flexibility performance are significantly affected by operational and strategic information sharing.

In other studies, Hasan (2020) indicated that information sharing significantly impacts customer satisfaction; Li et al. (2019) found that information sharing is positively associated with strategic coordination; Nazifa and Ramachandran (2019) reveal that information sharing provide supply chain partners the capacity to improve product quality and optimize the supply chain. In addition, Topal and Sahin (2018) and Huo, Han and Prajogo (2016) proved that information integration has positive consequences on company performance in terms of operational efficiency, service quality and financial performance.

Based on the above empirical reports, the following hypotheses are formulated and tested:

- H01:** There is no significant relationship between information sharing and cost reduction of pharmaceutical products distributors in Rivers State.
- H02:** There is no significant relationship between information sharing and product availability of pharmaceutical products distributors in Rivers State.
- H03:** There is no significant relationship between information sharing and strategic flexibility of pharmaceutical products distributors in Rivers State.

Methodology

This study adopted a survey research design. The population of the study comprised 35 major pharmaceutical product distributors in Rivers State which are enlisted in the Nigeria Directories (2020). The sample size of the study was the same as the population. 2 copies of questionnaire were administered to top management staff of each of the 35 pharmaceutical products distributors. This means that a total of 70 respondents took part in the study. Categories of the respondents included procurement managers and marketing manager. The questionnaire used to collect primary data was tested for reliability using the Cronbach's Alpha test. With the help of Statistical Packages for the Social Sciences (SPSS) version 23.0, Pearson's Product Moment Correlation (PPMC) was used to test hypotheses. The probability criterion of 0.05 significance level was adopted for accepting the null hypotheses at ($P>0.05$) or rejecting the hypotheses at ($P<0.05$).

Table 1: Reliability Test - Cronbach's Alpha Analysis

S/N	Variables	Number of Items	Cronbach's Alpha Coefficients
1	Information Sharing	3	0.887
2	Cost Reduction	3	0.862
3	Product Availability	3	0.87
4	Strategic Flexibility	3	0.867

Source: SPSS Output form field data

As evidenced in Table 1, the results of the Cronbach's alpha analysis revealed that all the variables in the study produced high Cronbach's Alpha coefficients indicating that, there is inter-item consistency among the variables in the study. This means that, if this study is conducted again in similar condition, the results would be similar to the results of our study.

Data Analyses and Results

Table 2: Descriptive Statistics of Information Sharing

	N	Sum	Mean	Std. Dev.	Variance
To what extent does your organization facilitate open and transparent communication channels with supplier?	63	198	3.25	.789	.622
To what extent does your organization share real-time data and information with suppliers to improve supply chain efficiency?	63	244	4.00	1.111	1.233
To what extent does your organization utilize collaborative platforms and technologies to enhance information sharing across the supply chain?	63	258	4.23	1.086	1.180
To what extent does your organization ensure that critical information is accurately and promptly shared with supplier?	63	248	4.07	1.109	1.229
Valid N (listwise)	63				

Source: SPSS Output, 2024.

Table 2 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of respondents expressed very high and high extents of agreement with the items on the questionnaire with respect to information sharing. However, it can be seen that question 3 which sought to determine the extent to which managers of pharmaceutical products distributors in Rivers State utilize collaborative platforms and technologies to enhance information sharing

across the supply chain, has the highest mean score of 4.23. This shows that question 3 has the strongest influence on the variables.

Table 3: Descriptive Statistics of Cost Reduction

	N	Sum	Mean	Std. Dev.	Variance
To what extent have you been able to identify and eliminate inefficiencies in your supply chain to reduce costs?	63	273	4.48	1.089	1.187
To what extent have you been able to achieve cost savings through strategic supplier negotiations and partnerships?	63	251	4.11	1.034	1.070
To what extent have you been able to leverage technology and automation to lower supply chain operating costs?	63	254	4.16	.898	.806
To what extent have you been able to optimize transportation and logistics to reduce shipping and handling expenses?	63	247	4.05	.669	.448
Valid N (listwise)	63				

Source: Field Survey, 2024.

Table 3 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents expressed very high and high extents of acceptance to the research question with respect to cost reduction. However, it can be seen that question 1 which sought to determine the extent to which managers of pharmaceutical products distributors in Rivers State have been able to identify and eliminate inefficiencies in their supply chain to reduce costs, has the highest mean score of 4.48. This shows that question 1 has the strongest influence on the variables.

Table 4: Descriptive Statistics of Product Availability

	N	Sum	Mean	Std. Dev.	Variance
To what extent have you been able to maintain optimal inventory levels to ensure product availability while minimizing excess stocks?	63	258	4.23	.883	.780
To what extent have you been able to forecast demand accurately to prevent stockouts and overstock situations?	63	268	4.39	.900	.809
To what extent have you been able to improve supplier lead times to ensure timely delivery of products?	63	263	4.28	.452	.204
To what extent have you been able to implement inventory management systems to track and manage stock levels effectively?	63	266	4.36	.932	.868
Valid N (listwise)	63				

Source: Field Survey, 2024.

Table 4 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of respondents expressed very high and high extents of acceptance to the research question with respect to product availability. However, it can be seen that question 2 which sought to determine the extent to which managers of pharmaceutical products distributors in Rivers State have been able to forecast demand accurately to prevent stockouts and overstock situations, has the highest mean score of 4.48. This shows that question 2 has the strongest influence on the variables.

Table 5: Descriptive Statistics of Strategic Flexibility

	N	Sum	Mean	Std. Dev.	Variance
To what extent have you been able to adapt your supply chain strategy in response to changing market conditions and customer demands?	63	266	4.36	.984	.968
To what extent have you been able to develop and maintain flexible supplier agreements that allow for adjustments in order quantities and delivery schedules?	63	256	4.20	1.093	1.194
To what extent have you been able to implement modular and scalable supply chain processes to accommodate fluctuations in demand?	63	263	4.28	1.035	1.071
To what extent have you been able to diversify your supplier base to reduce dependency on a single source and increase flexibility?	63	255	4.18	.885	.784
Valid N (listwise)	63				

Source: Field Survey, 2024.

Table 5 depicts high mean scores of the questionnaire items ranging over 3.00, this means that greater number of the respondents expressed very high and high extents of agreement with the items on the questionnaire with respect to strategic flexibility. However, it can be seen that item 1 which sought to determine the extent to which managers of pharmaceutical products distributors in Rivers State adapt supply chain strategy to changing market conditions and customer demands, has the highest mean score of 4.36.

Table 6: Relationship between Information Sharing and Cost Reduction

		Information Sharing	Cost Reduction
Information Sharing	Pearson Correlation	1	.787**
	Sig. (2-tailed)		.000
	N	63	63
Cost Reduction	Pearson Correlation	.787**	1
	Sig. (2-tailed)	.000	
	N	63	63

**, Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2024.

Table 6 shows a correlation coefficient of 0.787** between information sharing and cost reduction, indicating a strong significant relationship between information sharing and cost reduction. More so, the probability value (0.000) is less than the critical value (0.05), this shows a strong significant relationship between information sharing and cost reduction; and implies that information sharing can be used by pharmaceutical products distributors in Rivers State to achieve cost reduction. Thus, we reject the null hypothesis that there is no significant relationship between information sharing and cost reduction of pharmaceutical products distributors in Rivers State.

Table 7: Relationship between Information Sharing and Product Availability

		Information Sharing	Product Availability
Information Sharing	Pearson Correlation	1	.490**
	Sig. (2-tailed)		.000
	N	63	63
Product Availability	Pearson Correlation	.490**	1
	Sig. (2-tailed)	.000	
	N	63	63

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2024.

Table 7 displays a correlation coefficient of 0.490** between information sharing and product availability, indicating a moderate significant relationship between information sharing and product availability. The probability value (0.000) of the correlation is less than the critical value (0.05), this shows that the relationship between the variables is statistically significant; and implies that information sharing can be used by pharmaceutical products distributors in Rivers State to boost product availability. Based on this, we reject the null hypothesis that there is no significant relationship between information sharing and product availability of pharmaceutical products distributors in Rivers State.

Table 8: Relationship between Information Sharing and Strategic Flexibility

		Information Sharing	Strategic Flexibility
Information Sharing	Pearson Correlation	1	.887**
	Sig. (2-tailed)		.000
	N	63	63
Strategic Flexibility	Pearson Correlation	.887**	1
	Sig. (2-tailed)	.000	
	N	63	63

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2024.

Table 8 shows a correlation coefficient of 0.887** between information sharing and strategic flexibility. This high correlation coefficient indicates a very strong relationship between information sharing and strategic flexibility. The probability value (0.000) of the correlation is less than the critical value (0.05). This means that relationship between information sharing and strategic flexibility is statistically significant, and implies that information sharing can be used to achieve strategic flexibility of pharmaceutical products distributors in Rivers State. Therefore, the null hypothesis which denies the existence of significant relationship between information sharing and strategic flexibility of pharmaceutical products distributors in Rivers State is rejected.

Discussion of Findings

The analysis of the study reveal that information sharing has a strong positive and statistically significant correlation with cost reduction; a moderate positive and statistically significant correlation product availability; and a very strong positive and statistically significant correlation with strategic flexibility of pharmaceutical products distributors in Rivers State. These findings aligns with arguments of scholars and reports of previous studies.

The findings agree with the findings of Lee and Kim (2023) that information sharing has strong influence on trust and commitment in a supply chain; and that of Reenu et al. (2022) that information sharing plays a key role in enhancing the of supply chain performance in terms of delivery performance and flexibility, as well as cost reduction and service quality.

Also, the findings of cohere with the reports that information sharing enhance supply chain performance by impacting supply chain optimization (Ahmed, 2022). The finding further support the findings of Gebisa1 and Ram (2021) which examined effect of information sharing and inventory management in the supply chain practices on firms' performance, and showed that information sharing and inventory management practices have direct significant effect on companies' performance.

Conclusion and Recommendations

In line with the findings and the extent of their consistency with results of similar previous, this study concludes that information sharing has significant relationship with supply chain optimization of pharmaceutical products distributors in Rivers State. This means that information sharing is an imperatives to improved supply chain optimization that manifests in cost reduction, product availability and strategic flexibility.

Based on the findings of the study and to the extent of their consistency with the result of previous studies, we recommend as follows:

1. Managers of pharmaceutical products distributors should adopt information sharing as a means to meet up with today's competitive trends; this will enhance their supply chain optimization.
2. Managers of pharmaceutical products distributors should share information to meet up with present day business turbulence, as this will help them record cost reduction, increase product availability and strategic flexibility.

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