

## Supplier Involvement and Supply Chain Competitiveness of Fertilizer Manufacturing Firms in Nigeria

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### **Abstract**

*This study investigated the relationship between supplier involvement and supply chain competitiveness of fertilizer manufacturing firms in Nigeria. The research addressed the extent to which supplier involvement, influenced outcomes such as cost reduction, product quality, and responsiveness. The research designed was a correlational investigation and used the questionnaire in generating data from 35 senior staff from a population of 7 fertilizer manufacturing firms in Nigeria. A total of 3 null hypotheses were stated, with the bivariate analysis carried out using the Pearson's Product Moment Correlation (PPMC). Evidence from the analysis showed that supplier involvement significantly influences outcomes of competitiveness. The findings revealed that supplier involvement, positively drive and contribute toward the capacity of the fertilizer manufacturing firms to reduce their costs, advance quality products, and also responsive as well. It was concluded that related actions by the management of the fertilizer manufacturing firms in Nigeria, geared toward advancing healthier and more positive involvement of their suppliers, is critical to their capacity to drive and advance their supply chain competitiveness. Hence, it was recommended that supplier involvement actions by the management of the fertilizer manufacturing firms in Nigeria build on sustainable partnerships and collaboration.*

**Keywords:** *Supplier involvement, supply chain competitiveness, transaction cost view, cost reduction, responsiveness, product quality*

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### **Introduction**

In today's business environment and competitive marketplace, integrating suppliers into the new product development (NPD) process offers manufacturers the potential for substantial improvements in their new products (Zimmermann *et al.*, 2016). As a result, supply chain management has recognized the importance of involving suppliers in NPD (Laursen & Andersen, 2016; Yenyurt *et al.*, 2014). Supplier involvement is supplier participation in the integrated product development process. Involving suppliers has also been described as supplier integration (Wagner, & Neshat, 2012) or as supplier engagement (Saunders *et al.*, 2015). Providing detailed information about components, interdependencies between different elements of a new product, or even designing the overall result has been shown to

### *Strategic Management Practices and Sustainable Development in a Global Economy*

be highly beneficial when supplier involvement is involved (Suurmond et al., 2020). Successful supplier's involvement in new product development (NPD) may help firms to have a distinct advantage over their competitors in terms of the technologies used and developments in cost and time (Belderbos et al., 2015). The NPD process requires collaboration from different departments, such as manufacturing, marketing, and quality personnel. It also requires knowledge, information, technology, and collaboration with external partners such as customers and suppliers. Given the accelerating rate of utilization of new technology and the increasing nature of market and economic volatility, firms operating in uncertainties are more difficult to accurately predict and understand technological changes and market conditions (Melander & Tell, 2014). Integration results in improvements in product quality, project costs, development and time-to-market (Vahabzadeh, Asiaeim, & Zailani, 2015). While supplier involvement is generally believed to be beneficial for achieving better new products faster, several studies have been carried out on supplier involvement by different researchers using different industries and methodologies. Oktapia, Siagian, and Tarigan (2022) investigated the effect of early supplier involvement on firm performance through teamwork and new product development. Siagian, Tarigan, and Jie (2021), conducted a study that investigated the impact of supply chain integration on business performance through supply chain resilience, supply chain flexibility, and innovation system in Indonesia's manufacturing companies. While Sikuku, Namusonge, and Nangila (2018) studied the influence of supplier involvement on supplier performance in Kenya. These studies were however, conducted using outcome variables, other than competitiveness or used data bases other than fertilizer companies. Hence, they do not provide sufficient knowledge to managers of fertilizer companies that face competitiveness challenges. Therefore, this study joins the discourse by examining the relationship between supplier involvement and competitiveness of fertilizer manufacturing companies in Nigeria.

### **Literature Review**

#### **Theoretical framework**

This study is based on the transaction cost theory. According to Williamson (2016), the development of transaction cost economics began in the Neoclassical era. This point of view was dominant and widely accepted in the era before Williamson developed his full TCE model (Williamson 2016). Economic theory based on transaction costs is driven by the uncertainty caused by the external environment as well as by the costs incurred due to coordination and transaction costs. Uncertainties and costs are influenced by human agents characterized by bounded rationality and opportunism for analyzing transaction costs. Transaction Cost Economics (TCE) explores how business partners work together to protect each other from harmful affiliates with disparate relationships. Transaction costs determine the governance structure of a supply chain. So, in light of globalization, a firm has to decide if it will follow a domestic or global source to supply its needs. Either natural or mechanical doubt might be an adverse factor for buyer-supplier relationships. This is the most important new institutional theory that focuses on buy-versus-manufacture sourcing decisions. When a supplier provides components to a buyer, the supplier's performance as demonstrated by quality, cost and service can be measured (Monczka et al., 2021).

**Concept of Supplier Involvement:** Supplier involvement refers to how closely suppliers participate in the new product development (NPD) processes of their manufacturers by providing their suppliers with knowledge, resources, and participating in decision-making (Nguyen, Yu, Melewar, & Chen, 2015; Yenyurt, Henke, & Yalcinkaya, 2014). Supplier involvement is described as the process of managing the involvement of suppliers in the development of new products/services/processes/technologies for chosen category (Luzzini et al., *Proceedings of the 2nd Uniben Faculty of Management Sciences International Conference*, 2015). It can be conceptualized into three aspects: suppliers are involved early in NPD (Laursen & Andersen, 2016; Menguc, Auh, & Yannopoulos, 2014); manufacturers frequently involve suppliers in decision-making (Chaudhuri, Mohanty, & Singh, 2013); and manufacturers and suppliers form a partnership rather than a contractual relationship (Bao, Li, Pang, Bao, & Yi, 2017). For buyers to remain competitive, the integration of suppliers will be an essential factor. Supplier involvement in the development of a new product yields significant results in terms of product performance, time-to-market, product quality, as well as the development of new competencies and the conservation of resources (Sjoerdsma & van Weele, 2015). As manufacturers and suppliers have different domains of expertise, they enhance joint innovation efforts by providing their domain knowledge and combining their expertise (Jean, Sinkovics, & Hiebaum, 2014). Increasingly, manufacturing firms today are involving suppliers in the development of their new products in order to cope with the ongoing challenge of increased global competition and maximizing customers' satisfaction in high innovation, quality and low-cost demanding market conditions.

### **Concept of Competitiveness**

Competitiveness is a relative construct and at the same time multidimensional and the development of this concept is critical to survival in a changing and competitive environment, and has attracted the attention of academics and practitioners. Competitiveness is the relative strength of an entity needed for competing against direct and indirect competitors (Cho, 1998 as cited in Isoghom & Aja, 2018). In a hyper-competitive market environment, competitiveness is the actual solution for gaining competitive advantage (Isoghom & Aja, 2018). Supply chain competitiveness is rapidly gaining importance in view of the realization that only firms that are competitive enough from both supply chain and customer satisfaction point of view will survive in the competitive environment. Supply chain competitiveness is the efficient management of activities in a supply chain to gain competitive advantage (Jones & Riley, 1985 as cited in Isoghom & Ajah, 2018). Overall, competitiveness in the supply chain is essential for a firm's success in a given industry. By possessing unique resources and capabilities, having efficient operations, being flexible and continuously improving, firms can gain a competitive edge that allows them to thrive in today's fast-paced and ever-changing business environment. (Akpotu, Asiegbu & Tamunoski- Amadi, 2013). Supply chain competitiveness can be achieved by efficient delivery, customer satisfaction, better quality, profitability, better responsiveness reduced response time, demand fulfillment, optimal utilization of facilities (Verma & Seth, 2010).

**Cost Reduction:** Cost reduction is the unstoppable process of critical cost examination, analysis and challenge of standards (Isoghom & Ajah, 2018). Cost reduction can be found everywhere in the business: production, processes, methods, manufacturing, organization and staff. Bruce (1992) as cited in Isoghom and Ajah (2018) described cost reduction as the application of procedures to monitor expenditures and manufacturing operations with projected completion

to measure variances from authorized budgets and allow effective action to be taken to achieve minimal cost. There are several ways to achieve cost reduction, including negotiating deals with suppliers, optimizing production processes, and cutting unnecessary expenses. However, it's important to find the right balance between cost reduction and maintaining the quality of the product or service offered to customers. (Isoghom, Didia & Harcourt, 2022). Cost reduction is an act of lowering current fixed costs and variable costs. It focuses on reducing total cost compared to income generated. Waste reduction is a crucial factor in cutting supply chain costs because it reduces the number of resources wasted during the manufacturing process. Companies need to analyze their supply chain processes and identify areas where waste can be reduced. This could include improving *Strategic Management Practices and Sustainable Development in a Global Economy* manufacturing efficiency, switching to more eco-friendly materials, and designing products with minimal waste.

**Product Quality:** Product quality is the ability of a firm to offer a product or service performance that creates higher value for customers (Sachitra, 2016). Quality is the degree to which a set of inherent characteristics meets the requirements of the customer. Quality is an important tool for measuring customer satisfaction and also influences performance of the firm (Nadube & Barango-Tariah, 2020). Quality can also be measured by the level of innovation and efficiency in a company's processes. By constantly improving on their operations, businesses can reduce waste, optimize their resources, and increase their ability to deliver high-quality products and services consistently (Hamiton-Ibama & Ogonu, 2019). Customers are sensitive to quality; hence firms have to improve product or service quality (Mboya & Kazungu, 2015). According to Bezic, Cerovic, and Galovic (2011), quality is the second factor in increasing industry competitiveness and this increased competitiveness has encouraged firms to focus on quality (Khare, Saxsena & Teewari 2012).

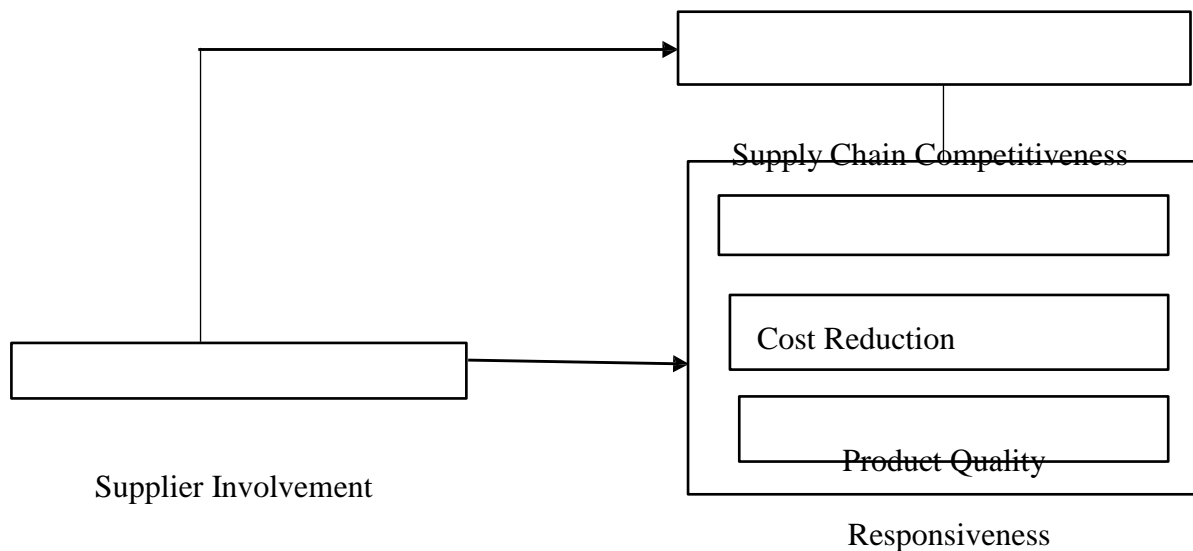
**Responsiveness:** According to Bruque-Camara, Moyano-Fuentes & Maqueira-Marin, 2016), supply chain responsiveness is the ability of the firms to flexibly and simultaneously react to operation as well as strategic demands. Responsiveness of the supply chain is described as the capability of firms to respond persistently, in appropriate time to the demand of customers or change in market place to sustain its competitive advantage. To achieve high levels of responsiveness, organizations must have optimal processes and systems in place. This involves identifying and addressing bottlenecks in the production line, streamlining workflows, improving communication channels and investing in technology. According to Qi, Huo, Wang, and Yeung (2017), firms' responsiveness can be measured by how well the key activities within the supply chain systems are coordinated. This covers coordination and flows of materials, information, processes and knowledge.

### **Supplier Involvement and Competitiveness**

Several empirical studies show the relationship between supplier involvement and competitiveness. Oktapia, Siagian, and Tarigan (2022) investigated the effect of early supplier involvement on firm performance through teamwork and new product development and concluded that early supplier involvement indirectly affects firm performance through new product development and teamwork, respectively and simultaneously. These findings provide an insight for manufacturing management to consider early supplier involvement in developing new products and enhancing firm performance. Siagian, Tarigan, and Jie (2021), conducted a study that investigated the impact of supply chain integration on business

performance through supply chain resilience, supply chain flexibility, and innovation system in Indonesia's manufacturing companies. They concluded that supply chain integration improves business performance through innovation, supply chain flexibility, and supply chain resilience in the COVID-19 era. Sikuku, Namusonge, and Nangila (2018) studied the influence of supplier involvement on supplier performance. A strong positive statistically significant relationship between supplier involvement and supplier performance was obtained. They recommended that the suppliers should be involved at every stage of production so that they own the process. Based on the foregoing, the paper hypothesized that;

H01: There is no significant relationship between supplier involvement and cost reduction. H02: There is no significant relationship between supplier involvement and product quality. H03: There is no significant relationship between supplier involvement and responsiveness



**Figure. 1.** Conceptual Framework of the Relationship between Supplier Involvement and Supply Chain Competitiveness of Fertilizer Manufacturing Firms in Nigeria.

**Methodology**

This study employs the hypothesis testing or explanatory research design which is the quantitative phase to answer the interactions between the criterion and predictor variables of the problem under study (Akpomi & Kayii, 2020; Israel, 2013). The study adopted a correlational investigation to assess the extent to which supplier relationship management relate with competitiveness of fertilizer manufacturing firms in Nigeria. The population for this study comprises the seven (7) fertilizer manufacturing companies operating in Nigeria (International fertilizer development center, 2021; Africa Fertilizer, 2019). Five (5) respondents based on their portfolio were drawn from each of the companies, as they are knowledgeable about the issues discussed in this study. Therefore, the total respondents for the study are thirty-five (35). The primary source of data collection is employed in the course of this research study. The structured questionnaire was utilized as the data collection instrument (Israel, 2013).

**Result**

**Univariate Data Analysis**

Descriptive tools such as the mode, mean and standard deviation were emphasized in this section and utilized as a basis for providing evidence on dominant views or perceptions of the variables with regard to their manifestations within the context of the fertilizer manufacturing firms in Nigeria.

*Strategic Management Practices and Sustainable Development in a Global Economy*

**Table 1 Distribution for supplier involvement**

	Very Low Extent		Low Extent		Moderate Extent		High Extent		Very High Extent		Total	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	
Our firm involves key suppliers that share technical knowledge with us during	6	17.1 %	13	37.1 %	0	0.0%	10	28.6 %	6	17.1 %	35	2.00
Our firm involves key suppliers that share market knowledge with us during	7	20.0 %	10	28.6 %	0	0.0%	9	25.7 %	9	25.7 %	35	2.00
Our suppliers are actively involved in a design and development activities	7	20.0 %	7	20.0 %	0	0.0%	10	28.6 %	11	31.4 %	35	5.00

Our frequentl 2 5.7% 9 25.7 0 0.0% 10 28.6 14 40.0 35 5.0  
interact with new  
team during developme  
process

Our constitutes significant  
portion  
of the overall new  
product development  
effort

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Source: Research survey, 2023

Evident from the distribution is the position that while suppliers are involved, key suppliers with technical and market knowledge appear to be neglected or are also carried along as they probably ought to. Nonetheless, supply involvement provides mixed evidence with regard to the behavior of the fertilizer manufacturing firms in Nigeria.

**Table 2 Distribution for cost reduction**

	Very Low Extent	Low Extent	Moderate Extent	High Extent	Very High Extent	Total	Mode
	Count Row N %	Count Row N %	Count Row N %	Count Row N %	Count Row N %	Count	
We have significant financial reserve to cover all needs due to cost reduction.	3 8.6%	12 34.3	2 5.7%	5 14.3	13 37.1	35	5.00
Our firm has reduced procurement costs	5 14.3%	8 22.9%	0 0.0%	16 45.7%	6 17.1%	35	4.00
Our firm has reduced overhead costs	2 5.7%	6 17.1%	0 0.0%	16 45.7%	11 31.4%	35	4.00

Source: Research survey, 2023

The distribution for cost reduction is revealed to be substantial, as evidenced on table 4.8. The result demonstrates that majority of the respondents identify their firms as experiencing cost reductions in terms of significant financial reserves, the offering of prices lower than those of their competitors, reductions in the cost to serve business partners and also procurement costs.

**Table 3 Distribution for product quality**

	Very Low Extent	Low Extent	Moderate Extent	High Extent	Very High Extent	Total	Mode
	Count Row N %	Count Row N %	Count Row N %	Count Row N %	Count Row N %	Count	



We are able to compete based on quality	4	11.4%	15	42.9%	0	0.0%	4	11.4%	12	34.3%	35	2.00
We offer products of high quality to our	5	14.3%	14	40.0%	0	0.0%	0	0.0%	16	45.7%	35	5.00
We offer products that are highly reliable	5	14.3%	10	28.6%	0	0.0%	18	51.4%	2	5.7%	35	4.00
We offer products that are very durable	2	5.7%	11	31.4%	0	0.0%	12	34.3%	10	28.6%	35	4.00
We offer products with best features	3	8.6%	10	28.6%	0	0.0%	16	45.7%	6	17.1%	35	4.00

Source: Research survey, 2023

### *Strategic Management Practices and Sustainable Development in a Global Economy*

The distribution for product quality for the firms is observed to have a mix of perceptions with regard to the attributes of the fertilizer manufacturing firms. Evidence on the distribution reveals that while the property on competing based on quality has a low position ( $m = 2$ ), all other items or indicators are revealed to be evident – thus substantially characterizing the fertilizer manufacturing firms.

**Table 4 Distribution for Responsiveness**

	Very Low Extent		Low Extent		Moderate Extent		High Extent		Very High Extent		Total	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Mode
We react to changes in the industry	6	17.1%	17	48.6%	0	0.0%	5	14.3%	7	20.0%	35	2.00
We consider customers opinions on product and services provided	15	42.9%	6	17.1%	0	0.0%	0	0.0%	14	40.0%	35	1.00
We are able to know changes in customers' needs in a timely	10	28.6%	13	37.1%	0	0.0%	0	0.0%	12	34.3%	35	2.00
We adopt customer change request	2	5.7%	11	31.4%	0	0.0%	7	20.0%	15	42.9%	35	5.00
We are able to reduce development lead	4	11.4%	8	22.9%	0	0.0%	10	28.6%	13	37.1%	35	5.00

Source: Research survey, 2022

The distribution for responsiveness indicates that there is a high level of mixed views on the aspect of responsiveness of the firms. The evidence indicates that most of the respondents consider their firms as low on the aspect of reaction to changes in the industry ( $m = 2$ ), consideration of customer opinions in product services ( $m = 1$ ), and ability to know changes in customer needs on a timely manner ( $m = 2$ ); however, with regards to items such as adoption of customer requests ( $m = 5$ ), and ability to reduce development lead time ( $m = 5$ ) are observed to have affirmative responses that are very high.

### Bivariate Data Analysis

Hypotheses were stated at a 95% confidence interval – hence a 0.05 level of significance. Tests were 2-tailed and as such non-directional – assessing both positive and negative relationships.

**Table 5 Result for Relationship between Supplier Involvement and Competitiveness**

		Supplier Involvement	Cost Reduction	Product Quality	Innovativeness	Responsiveness
Supplier Involvement	Pearson Correlation	1	.759**	.688**	.817**	.807**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	35	35	35	35	35
Product Quality	Pearson Correlation	*	1	*	**	.591**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	35	35	35	35	35
Responsiveness	Pearson Correlation	.688**	.775**	1	.592**	.610**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	35	35	35	35	35
Supplier Involvement	Pearson Correlation					1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	35	35	35	35	

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

Source: Research survey, 2023

The test for the hypotheses between supplier involvement and the measures of competitiveness is revealed to be significant in all instances. The evidence as shown in table 4.14 indicates that supplier involvement significantly correlates with cost reduction ( $R = 0.759$  and  $P_v = 0.000$ ;  $R^2 = 0.576$ ), product quality ( $R = 0.688$  and  $P_v = 0.000$ ;  $R^2 = 0.473$ ), and responsiveness ( $R = 0.807$  and  $P_v = 0.000$ ;  $R^2 = 0.651$ ); thus, enhancing the manifestations of these variables within the context of the fertilizer manufacturing firms in Nigeria. From the results generated, it is therefore evident that supplier involvement significantly predicts outcomes of competitiveness – hence the following results are stated:

- i. Supplier involvement has a significant relationship with cost reduction of fertilizer manufacturing firms in Nigeria
- ii. Supplier involvement has a significant relationship with product quality of fertilizer manufacturing firms in Nigeria
- iii. Supplier involvement has a significant relationship with responsiveness of fertilizer manufacturing firms in Nigeria.

### **Discussion of the Findings**

The relationship between supplier involvement and competitiveness is observed to be significant, where supplier involvement is noted to significantly enhance outcomes of cost reduction, product quality, innovativeness and responsiveness. The relationship between the variables anchors on the actual participation and involvement of suppliers in various decision-based actions and processes of the firm, signifying the idea that their inputs and ideas are applied in the actions and operations of the firm. Supplier involvement is a critical aspect of supplier relationship management as it requires the structuring of relationships and platforms through which the firm is able to effectively engage and apply the opinions of suppliers in their processes. Nguyen et al (2016) asserted that it involves the various levels of processes and protocols which enable the integration of the suppliers as a core aspect and contributor to the firm's decision-making process. Its sensitivity draws on the extent of involvement and the imperatives of transparency in the interaction or collaboration with the suppliers. The studies of Siagian et al (2021) identified the leadership of the firm as conditioning the nature of power distribution and the extent to which stakeholders are involved or able to actively participate in the decision-making processes of the firm. Their perspective offers a position that identifies leadership as the necessitating factor behind the involvement of stakeholders and their recognition as partners of the firm – Suggesting that the management of the fertilizer manufacturing firms are key actors in determining the extent to which supplier involvement is manifested or expressed within the context of the industry. According to Tensg (2014) the healthy interactions and exchanges between the firm and its suppliers can be channeled toward increasing the trust and confidence both parties have in themselves – increasing their willingness to work and cooperate in more tasks or projects.

### *Strategic Management Practices and Sustainable Development in a Global Economy*

Through increased inclusivity and the advancing of opportunities and avenues for participation, firms can create a sense of shared responsibility, in which suppliers can identify with the firm on the basis of their roles and contributions to the achievement of its objectives and goals.

### **Conclusion**

In line with the evidence advanced on the operational relationship between the variables, this study concludes that supplier involvement actions are essential to the pooling of ideas and collective or joint innovativeness. Involvement reinforces partners commitment to success and assures of shared responsibility in the outcome of decisions. This is important for healthy exchanges between the firms and their suppliers- bridging differences and enhancing a shared position on market realities; thus, contributing at a substantial extent to the competitiveness of the fertilizer manufacturing firms in Nigeria.

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