

## Effect of Supplier Development on Operational Performance of Manufacturing Firms in Nigeria

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**Abstract:** Emerging trend has suggested that Supplier Development could serve as a more modern tool of competitive advantage that firms can leverage on to improve and sustain their organizational performance. This study investigates the effect of supplier development on operational performance of manufacturing firms in Nigeria with particular reference to Dangote Sugar Refinery (DSR). The specific objectives of this research are to; Determine whether supplier technical support has statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc, Evaluate whether early supplier involvement has statistically significant effect on cost efficiency at Dangote Sugar Refinery Plc and Ascertain whether supplier audit has statistically significant effect of supplier financial supports on operational efficiency at Dangote Sugar Refinery Plc.. Primary data was collected by means of a well-structured questionnaire and the data collected were collated and analyzed using the Statistical Product and Service Solution (SPSS). Methodologically, descriptive survey research design of the quantitative approach was employed. Study population covered the entire top middle and lower level management staff of the Dangote Sugar Refinery (DSR) Plc. in Apapa, Lagos, Bompai in Kano and Nkpor-Onitsha in Anambra which according to field survey was 15,026. However, using Yamene (1967) formula sample size determination technique, a sample size of 390 was selected. Bowley's allocation proportional formula was further used to determine each of the DSR's selected location respective size. Retrieved data were statistically tested using descriptive statistics (include frequencies and percentages) and inferential statistics (simple regression method). It was found-out that supplier technical support has statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc., early supplier involvement has statistically significant effect on cost efficiency at Dangote Sugar Refinery Plc., supplier audit has statistically significant effect on operational efficiency at Dangote Sugar Refinery Plc. and supplier certification has statistically significant effect on customer service delivery at Dangote Sugar Refinery Plc.

**Keywords:** supplier development, supplier technical support, supplier audit and operational performance

### 1. INTRODUCTION

Conventionally, the marketplace is almost saturated. Thus, since firms compete for limited market, future-centric firms are forced to be more strategic with regards to their resource utilization so as to gain competitive advantage. Hitherto, the hype has been on the employees, reduction of wastages and production costs within an organization, however, emerging trend has suggested that Supplier Development could serve as a more modern tool of competitive advantage that firms can leverage on to improve and sustain their organizational performance. Supplier Development has been characteristically defined as any premeditated long-term business strategy (a cooperative efforts) instituted by a buying firm to create, increase, expand and maintain the core competencies and capabilities of supplying-firm(s) principally to meet the buying firm's short- and/or long-term supply needs (Al-Doori, 2019; Popoola, 2019). Contemporarily, there is no gainsaying to the fact that supplier development has become the most influential management process for achieving and improving organizational performance. As a matter of fact, corporate success nowadays transcends customers and/or employees relationship management, to include suppliers' technical, competence and capabilities development. Observably, fast-paced growth experienced within the last three decades globally, has reinforced the interconnectedness between buying and supplying firms to manage supply chain as part of a broader business strategy, and in particular to build and exploit shared relationships with supply chain partners.

Ahmad, et al (2019) is unequivocal that it is targeted at improving the operational performance of firms by giving them competitive advantage over their rivals. Amarjit et al. (2016) described a firm's operational performance as a measure of how well a firm uses its assets from its core operations and generates revenues over a given period of time. This measure is thus compared to some given industrial average standard of similar firms in the same industry. In the same vein, Hwang et al. (2014) perceived operational performance as firm's performance measured against standard or prescribed indicators of effectiveness and efficiency. With the fast-developing world economy and the shrinking global market, there has been a drastic increase in pressure on organizations to find new ways of creating and delivering value to their customers through supplier development. There has been a growing recognition of building relationship with the supplier for improvements in profitability, serviceability and reduced costs in the supply chain.

Supply chain studies (Marin-Garcia, et al., 2018; Easterby-Smith et al., 2019) have noted that empowering suppliers (in the area of financial support, technical support, early supplier involvement, supplier audit and supplier certification) is expected to strategically influence operational performance (especially in the areas of customer satisfaction, competitive advantage, cost efficiency, operational efficiency and customer service delivery). Notwithstanding the significance of supply development and its relationship with operational performance, it is observed that there is paucity of documented studies in Nigeria. Besides, the documented studies have reported conflicting results; while some studies (such as Babatunde et al., 2016; Adedokun et al, 2017; Erakpotobo, 2018) found significant positive link, some studies (such as Al-Doori, 2019; Essien et al., 2019) found insignificant positive link, still, other studies reported significant negative link and yet, some studies (such as; Anand and Grover, 2015; Ogundare and Alalade, 2018) reported insignificant negative link. Apparently motivated by the dearth of empirical studies and a couple empirical inconsistencies, this study is poised to examine how supplier development influence operational performance in Nigeria manufacturing firms.

### 2. STATEMENT OF THE PROBLEM

Dangote Sugar Refinery Plc. despite being the largest sugar refinery in sub-Saharan Africa and the second largest in the world is facing some problems from its current suppliers. First, DSR does not provide its suppliers financial supports beyond the payments for goods contracted and delivered. As a result of the financial weakness on the part of suppliers to meet-up with demands of DSR, in most cases, this leads to delays on the part of the suppliers to deliver goods in right quantity, quality and at the right time culminates into supply disruptions.

Besides, lack of suppliers' financial support, DSR suppliers also lack technical supports. DSR does not have direct investment in equipment and personnel of the suppliers, evaluation of supplier performance and sharing feedback on the evaluation results and visiting suppliers' plants. Most often than not, due to absence of supplier technical supports from DSR leading into engineering issues, technical misspecifications and failure to meet-up DSR's requirements have become recurring decimal among its suppliers.

Away from zero supplier technical support, it is not also in DSR's culture to ensure early supplier involvement thereby making it impossible for DSR to take advantage of the suppliers' technological expertise in design and manufacturing leading to poor risk and information sharing among others. Furthermore, it is observed that DSR seldom embark on supplier audit and this possess a threat on product quality and delivery standards. Also, supplier certification is not DSR's culture. It is therefore not surprising to find some DSR's suppliers not minimum requirement expected from the supplier to be eligible for working.

Thus, considering DSR's quest to continuously improve itself particularly in the areas of customer satisfaction, competitive advantage, cost efficiency, operational efficiency and customer service delivery, this study is poised at examining how supplier development influence its operational performance among manufacturing firms in Nigeria.

### 3. RESEARCH OBJECTIVES

The major objective of this study is to examine the effect of Supplier Development on the Operational Performance of Dangote Sugar Refinery (DSR) Plc.

The specific objectives of this study are to:

- i. Determine whether supplier technical support has statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc.
- ii. Evaluate whether early supplier involvement has statistically significant effect on cost efficiency at Dangote Sugar Refinery Plc.
- iii. Ascertain whether supplier audit has statistically significant effect of supplier financial supports on operational efficiency at Dangote Sugar Refinery Plc.

#### **4. RESEARCH HYPOTHESES**

This study will be guided by the following hypotheses:

H<sub>01</sub>: Supplier technical support has no statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc.

H<sub>02</sub>: Early supplier involvement has no statistically significant effect on cost efficiency at Dangote Sugar Refinery Plc.

H<sub>03</sub>: Supplier audit has no statistically significant effect on operational efficiency at Dangote Sugar Refinery Plc.

#### **5. LITERATURE REVIEW**

##### **5.1. Concept of Supplier Development**

Adedokun et al. (2017) noted that there is no single approach to supplier development but it is generally acceptable that it can be undertaken at three levels, that is, basic, moderate and advance level, according to the level of firm involvement and implementation complexity (skill, time, and resources required to execute successfully a particular activity). There is a consensus between Al-Doori (2019) and Iroegbu et al. (2018) that a fundamental pre-requisite to supplier development and indeed the development of any purchasing and supply management strategy, is that purchasing and supply management professionals should analyze and appreciate their own organization's corporate objectives and business needs before embarking on supplier development.

Yegon et al. (2015) remarked that supplier development projects which are undertaken must be in support of the purchasing and supply management strategy which, in turn, supports the organizational strategy. However, there are also such direct investments in supplier development that are more specific, advanced and time and resources consuming as well as complex to implement by the buyer. Although academia elaborates on a number of constructs in the context of supplier development, an immense majority of literature focuses only at a few of them.

Based on scholars' perspectives about supplier development, in the current study, the publications on supplier development were grouped into two categories: narrow perspective and broad perspective (Popoola, 2019). In the narrow perspective, as discussed by Shahbaz, et al. (2019), supplier development refers to the development of the supply base by creating new sources of supply (Quynh and Huy, 2018)).

The role of the purchasing staff in the narrow perspective is to develop or expand the supply base to meet supply requirements. In the narrow perspective, supplier evaluation is used for two purposes: (1) as a tool to decide if a vendor is qualified to supply products that meet the customer's quality standard; and (2) to create competition between suppliers, especially with regard to price. The publications grouped into the narrow perspective, essentially the first wave of supplier development studies, were generally based in the area of quality management studies (Okon, 2018; Chang et al., 2016; Afnde, et al., 2015).

In the current study, the broad perspective of supplier development is used; that is, supplier development is defined as activities undertaken by customers in their effort to improve supplier capabilities and/or performance to meet the customer firm's short and/or long-term supply needs (Al-Doori, 2019; Okon, 2018; Seo, et al., 2015; Mose, 2015; Amue and Ozuru, 2014). However, according to the dynamic capability view, the relational view and the investment model, supplier development may be perceived as an external accessible resource that may help the supplier to gain competitive advantage. Therefore, from the supplier perspective, the supplier's participation in supplier development is not only intended to meet the buying firm's short- and/or long-term supply needs, but also is a form of relation-specific investment that is being used to improve the supplier's competitive advantage or performance.

Supplier development should lead to improvement in the total added value from the supplier in question in terms of quality of product or service offered, business processes and performance, improvements in lead times and delivery to overall performance of the buying firm (Basu, et al., 2017). Anand and Grover (2015) stated that supplier development is normally undertaken with existing suppliers that can be, and agree to being, improved. Suppliers can be categorized in respect of supplier development in three ways; they are, being developed, on hold as a potential for development or, identified as not being worth the investment of development.

Sundram, et al. (2016) claims that direct involvement as a factor of supplier development consist of a set of practices such as: formal supplier evaluation, certification, recognition, informal supplier evaluation, supplier site visits, training, and buyer sites and facilities visits, as well as verbal or written demand for performance improvement. This set of practices composing direct involvement indicates a multidimensional nature of supplier development. In another study, Job (2015) argues that supplier development techniques consist of supplier training programme, supplier evaluation and assessment, supplier certification/qualification, provision of financial support, supplier audits, and providing incentives and recognition.

**Supplier Technical Support:** Njoku and Kalu (2015) sees Technical capability relates to engineering issues and the supplier's capability to meet performance and technical specifications and requirements. Activities related to the provision of technical support are fundamental to suppliers' performance. This technical support might consist of direct investment in equipment and personnel of the suppliers, evaluation of supplier performance and sharing feedback on the evaluation results, visiting suppliers' plants, and supplier certification (Mose, 2015).

**Early Supplier Involvement (ESI):** Chang et al. (2016) noted that ESI can be seen as a means to integrate suppliers' capabilities in the customer's supply chain and operations, thereby making it possible for the customer to take advantage of the suppliers' technological expertise in design and manufacturing. ESI is a relative concept since there are different levels to it, where the supplier's involvement ranges from low to high. At its lowest level of ESI can be just about providing information on the equipment and capabilities so that the customer's design team can integrate the information. At the highest level of ESI the supplier can take full responsibility for a part or sub-assembly, from concept to manufacture (Huang and Wang, 2017). ESI fulfils upfront supplier resources and expertise to accelerate the research and development (R&D) timeline and allow for risk sharing. ESI takes place when for example new products or existing product change and continuous improvement are all product development initiatives.

**Supplier Audit:** According to Tangus et al. (2015), supplier audit is an effective way to examine the quality of a particular supplier and the risk it presents to the organization before it becomes a problem. Companies can improve their overall quality by ensuring their supplier's product quality and delivery standards remain high – something a supplier audit seeks to establish. Supplier issues can cost a company money, or worse yet, cause harm to its customers. With an effective supplier quality management solution, a supplier audit can be painless and can identify serious problems early in the production cycle. Supplier audit benefits include adopt organizational quality standards, practice effective document management, identify areas of potential risk, recover the cost of poor quality, improve communication and improve customer satisfaction (Moses, 2015).

**Supplier Certification:** The supplier certification acts as a part of a larger strategy of the supplier quality management. It essentially is a process by which the organization can manage its relationship with its suppliers to coordinate as a single entity for creating value for all stakeholders (Hillman and Huston, 2016). The supplier certification specifies a minimum requirement expected from the supplier to be eligible for working. This process aims at a continuous improvement. The process of certification holds utmost importance due to the following reasons: i) it enables the process of identifying suppliers which can meet the requirements of the company; ii) it enables to gather a fair estimate of the potential of the suppliers, thus enabling judicious and safe decisions in terms of investing and money; iii) using supplier certification also enables avoidance of some processes such as inspection; iv) it regulates and forms consistent methods of managing the suppliers; v) it enables the development of capabilities of the supplier; vi) it establishes more open and stronger relationships; vii) it facilitates enhanced communication and better sharing of information; viii) it helps the organization serve its customers better and it helps achieve corporate improvement objectives through collaboration (Essien, et al., 2019; Hillman and Huston, 2016).

## 5.2. Concept of Operational Performance

According to Maestrini, et al. (2017) operational performance refers to “set of metrics used to quantify the efficiency and effectiveness of supply chain processes and relationships, spanning multiple organizational functions and multiple firms and enabling supply chain orchestration”. In addition to this, Amarjit et al. (2016) described a firm’s operational performance as a measure of how well a firm uses its assets from its core operations and generates revenues over a given period of time. This measure is thus compared to some given industrial average standard of similar firms in the same industry. In the same vein, Hwang et al. (2014) perceived operational performance as firm’s performance measured against standard or prescribed indicators of effectiveness and efficiency. Also, Azim et al. (2015) operational performance refers to the measurable aspects of the outcomes of an organization’s processes, such as reliability, production cycle time, and inventory turns. Operational performance in turn affects business performance measures such as market share and customer satisfaction.

The aim of every organization is to enhance the performance but for improvement, they must need to measure it accurately first. Supplier development has been measured with organizational performance and its dimension was profit, cost, return on investment and sale (Florian and Constangioara, 2014; Mbah et al., 2019). It can be concluded that supplier development performance had been measured by various ways like operational, organizational, firm, financial measures. The operational performance proposed by the study is expressed by customer satisfaction, competitive advantage, cost efficiency, operational efficiency and customer service delivery.

**Customer Satisfaction:** Elaho and Ejechi(2019) define customer satisfaction as a measure of a firms’ customer base in terms of size, quality and loyalty. Customer loyalty and product repurchase are as a result of customer satisfaction (Olise and Ojiaku, 2018). The main focus of companies today is to satisfy the customer which has an impact on the competitiveness of an enterprise. Customers’ expectations according to (Olise and Ojiaku, 2018) are largely dependent on the flexibility of the supply chain partners. Azigwe et al. (2016) view customer satisfaction as a person’s feelings of pleasure or disappointment resulting from comparing product’s perceived performance (or outcome) in relation to his or her expectation. From the definitions above, three general components of satisfaction can be identified: i) Consumer satisfaction is a response (emotional or cognitive); ii) The response pertains to a particular focus (expectations, product, consumption experience, and so on.); iii) The response occurs at a particular time (after consumption, after choice, based on accumulated experience, and so on).

**Competitive advantage** is defined as the capability of an organization to create a defensible position over its competitors (Li, et al., 2019). Aziz (2019) argues that competitive advantage comprises of distinctive competencies that sets an organization apart from competitors, thus giving them an edge in the marketplace. They further add that it is an outcome of critical management decisions. Miltenburg (2015) states that when a manufacturing company can defend and attract customers, that means it has competitive advantage, which today is crucial for manufacturing companies’ survival (Al-Qershi, 2019). A company has competitive advantage whenever it has an edge over rivals in securing customers and defending against competitive forces (Samad, et al., 2016).

To succeed in building a competitive advantage, a firm must try to provide what buyers will perceive as “superior value” -either a good product at a low price or a “better” product that is worth paying more for.

**Cost Effectiveness:** Kinyugo (2014) argued that cost effectiveness deals with cost reduction as well as continuous improvement and change instead of cost containment. The term cost reduction could be used in place of cost efficiency. Cost effectiveness consists of those actions that are taken by managers to reduce costs, some of which are prioritized on the basis of information extracted from the accounting system” (Kinyugo, 2014, p.15). Although cost reduction effectiveness seeks to reduce costs, it should not be at the expense of customer satisfaction. Ideally, the purpose is to adopt actions that will both reduce costs and enhance customer satisfaction. Hence, cost efficiency is used to make reduction in operating cost of manufacturing organizations. Operating costs are the expenses which are related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility. They are the cost of resources used by an organization just to maintain its existence.

**Operational Efficiency:** This refers to the capability of an organization to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support (Ahmad et al., 2019). Operational efficiency looks at an organization’s capabilities and performance. It also looks at an organization’s ability to minimize waste of inputs and maximize resource utilization so as to deliver quality, cheaper products and services to their customers. It is a useful measure utilized in managing the available resources. Azim et al., (2019) viewed operational efficiency as the capability of a service sector to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support.

**Customer Service Delivery:** According to Olise and Ojiaku (2018), customer service delivery refers to the fulfillment of customer’s orders efficiently, effectively and at the minimum cost. It involves meeting customers’ expectations with regard to order fulfillment through shorter lead times, consistent and on time delivery, complete orders, quicker response to customer requirements and ability to meet unique and special requests of the customers (Nwulu and Nwokah, 2019). In many cases, increasing customer service levels involves adding personnel and increasing overall expenditures. Unfortunately, these additional expenses can erode profitability. One proven method for increasing customer service without incurring additional long-term expenses is the implementation of an effective supply chain.

6. METHODOLOGY

Manufacturing firms are critical part of any economy especially in Nigeria. According to Nigeria Stock Exchange Fact-Sheet, there are more consumer and industrial goods manufacturing firms in Nigeria than automotive manufacturing firms. To this end, Dangote Sugar Refinery Plc. will be selected due to its position in the industry, nationally and within Sub-Saharan Africa. From a total population of 15,026 based from the selected branches of the Dangote Sugar Refinery staff population, using Taro Yamane’s formula a sample size of 390 respondents were given questionnaires for analysis.

Data analysis method will entail editing, coding and tabulation of data collected into manageable summaries. To ensure easy analysis, the questionnaire will be coded according to each variable of the study to ensure accuracy during analysis. This analysis will be conducted using the Statistical Package for Social Sciences (SPSS) and MS Excel. Data will be analyzed using descriptive statistics, which include frequencies and percentages and inferential statistics using correlation and regression method. These tools of analysis to be used, for instance, to determine the relationship that exists between dependent and independent variables

7. DATA ANALYSES

This section deals with the validation of the formulated hypotheses using inferential analyses. This is considered relevant or germane so as to achieve the cardinal objectives. The inferential statistics used are simple regression and correlation techniques. They are tested as follows:

Testing Hypothesis One

**Ho1:** Supplier technical support has no statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc.

Table1. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
2	.891 <sup>a</sup>	.794	.793	2.10058	.794	166.10	1	373	.000

Source: Researcher’s Computation using the SPSS V.25.0

The model summary results above show that the relationship between the predictors and dependent variables, depicted by the regression coefficient (R) value is .891 (89.1%). This means that there is a strong relationship between the two variables. Also, as indicated by the table, the variations in dependent variable as a result of the predicting variable, as indicated by R-Square value, is .793 (79.3%). This implies that about 79.3% variations in Competitive Advantage (CA) is explained by the

Supplier Technical Support (STS) with the remaining 20.7% being accounted for by other factors not included in the model. The F-Change is 166.10. This value is significant because the significance level is =.000 which is less than the 5%. This result implies that overall; regression model is statistically significant, valid and fit. This suggests implicitly that the independent variable has significant positive relationship with the independent variable.

**Table2. Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
2 (Constant)	.823	.461		1.787	.076
STS	.392	.016	.891	24.821	.000

a. Dependent Variable: Competitive Advantage (CA)

**Source:** Researcher’s Computation using the SPSS V.25.0

The coefficients regression table above shows that Supplier Technical Support (STS) has .891 coefficient value with t-statistics value of 24.821 and Sig. value of .000. The implication of this is that increase in Supplier Technical Support (STS) by one percent, holding other variables constant, will lead to increase in Competitive Advantage (CA) by 89.1%. This result is significant in view of the Sig. value (of .000) which is far less than 5%. Based on the empirical result, it is conspicuous that - there is a remarkable impact of Supplier Technical Support (STS) on competitive advantage at Dangote Sugar Refinery – thus, the null hypothesis is rejected.

**Testing Hypothesis Two**

**Ho2:** Early supplier involvement has no statistically significant effect on cost efficiency at Dangote Sugar Refinery Plc.

**Table3. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
3	.913 <sup>a</sup>	.834	.833	1.88299	.834	105.82	1	373	.000

**Source:** Researcher’s Computation using the SPSS V.25.0

The model summary results above show that the relationship between the predictors and dependent variables, depicted by the regression coefficient (R) value is .913 (91.3%). This means that there is a strong relationship between the two variables. Also, as indicated by the table, the variations in dependent variable as a result of the predicting variable, as indicated by R-Square value, is .834 (83.4%). This implies that about 83.4% variations in Cost Efficiency (CE) is explained by the Early Supplier Involvement (ESI) with the remaining 16.6% being accounted for by other factors not included in the model. The F-Change is 105.829. This value is significant because the significance level is =.000 which is less than the 5%. This result implies that overall; regression model is statistically significant, valid and fit. This suggests implicitly that independent variable has significant positive relationship with the independent variable.

**Table4. Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
3 (Constant)	1.112	.395		2.819	.005
ESI	.493	.017	.913	28.387	.000

a. Dependent Variable: Cost Efficiency (CE)

**Source:** Researcher’s Computation using the SPSS V.25.0

The coefficients regression table above shows that Early Supplier Involvement has .913 coefficient value with t-statistics value of 28.387 and Sig. value of .000. The implication of this is that increase in Early Supplier Involvement by one percent, holding other variables constant, will lead to increase in

Cost Efficiency (CE) by 91.3%. This result is significant in view of the Sig. value (of .000) which is far less than 5%. Based on the empirical result revealed from the regression analysis, it is apparent that - Early Supplier Involvement has significant positive impact on Cost Efficiency at Dangote Sugar Refinery – therefore, the above alternative hypothesis is accepted.

**Testing Hypothesis Three**

**Ho3:** Supplier audit has no statistically significant effect of supplier financial supports on operational efficiency at Dangote Sugar Refinery Plc.

**Table5.** Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
4	.863 <sup>a</sup>	.769	.769	2.01123	.769	133.12	1	373	.000

**Source:** Researcher’s Computation using the SPSS V.25.0

From the summary table above, from the column of R is evident that there is a correlation between the variables used in this study. The R = 86.3%. Its however, suggests that there is a relationship between performance appraisal and employees’ performance. On the other hand, the R-square is a measure of variance and how closely the variables are. With 13.7% rate, it therefore means that the predicting variables supplier’ audit and operational efficiency explained the independent variable. However, from the model summary result above, the f-value f (133.12) indicating that data obtained from the field survey do not support the null hypothesis, but that the data obtained from the field is compatible with the alternate hypothesis. However, the sig value in the table that is p = .000 is lower than the 95% significance level that is 0.005. Statistically, (p < α), this means that .000 < 0.05 significant. This therefore means that it is statistically significant.

**Table6.** Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
4	(Constant)	1.247	.379		2.755	.005
	SA	.488	.029	.831	19.417	.000

a. Dependent Variable: Operational Efficiency (OE)

**Source:** Researcher’s Computation using the SPSS V.25.0

The coefficients regression table above shows that Supplier Audit has .831 coefficient value with t-statistics value of 19.417 and Sig. value of .000. The implication of this is that increase in Supplier Audit (SA) by one percent, holding other variables constant, will lead to increase in Operational Efficiency (OE) by 83.1%. This result is significant in view of the Sig. value (of .000) which is far less than 5%. Based on the empirical result revealed from the regression analysis, it is apparent that – Supplier Audit has significant positive impact on operational efficiency at Dangote Sugar Refinery – therefore, the above alternative hypothesis is accepted.

**7.1. Discussion of Findings**

Empirical evidence from the inferential analyses revealed three (3) results based on the hypotheses tested. First, study found out that supplier technical support has statistically significant effect on competitive advantage at Dangote Sugar Refinery Plc. This implies that providing supplying-firm with state-of-the-art infrastructure, real-time decision support and flexible customizable support structure among others, strengthens buying-firm’s (such as Dangote Sugar Refinery) supplier development which in-turn bolsters its operating capability and give them competitive advantage. According to Njoku and Kalu (2015) finding, provisions of technical support are fundamental to suppliers’ performance. Thus, Tanguis et al. (2015) remarked that direct investment in equipment and personal quality of supplying-firm has become inevitable especially for large buying-firms to remain competitive and have competitive edge over others. Al-Doori (2019) maintained that having the right machineries, plants and other equipment needed to produce to the buying-firm’s taste sometimes transcend supplying-firm’s ability. Consequently, it is important for buying-firms to directly invest in the supplying-firm’s equipment build-up.



Secondly, Orina and Kimencu (2018) found that early supplier involvement can affect development costs in several ways and directions. First, involving suppliers at the early stages could reduce development costs by providing buying-firm with know-how about production possibilities at early stages and thus saving the customer time and money by preventing redesigns at later stages. Second, suppliers' information and expertise at an early stage could be used to reduce extra work and costs. Third, suppliers can identify opportunities to reduce costs for the customer at earlier stages when involved at the beginning of the development process. Fourth, suppliers can suggest, early in the development process, to use different materials in products, which will reduce the development costs and keep the product function the same.

However, Quynh and Huy (2018) reported that involving the supplier at later stages could increase development costs simply due to the fact that the generated idea by the customer might not be possible to produce by suppliers. This could cause delays and a re-design of the product, which will increase development costs significantly. Involving the supplier at the early stages could, however, also increase the development costs. Becoming depended on the supplier can cause an opportunistic behavior from the supplier and forcing the customer to pay the higher prices.

Lastly, supplier audit has statistically significant effect on operational efficiency at Dangote Sugar Refinery Plc. This implies that examining the quality of a particular supplier and the risk it presents to the organization before it becomes a problem has tremendous impact on organization's operational efficiency. Tangus et al. (2015) averred that companies can improve their overall quality efficiency by ensuring their supplier's product quality and delivery standards remain high – something a supplier audit seeks to establish. Moses (2015) reported that supplier audit benefits include adoption of organizational quality standards, practice effective document management, identify areas of potential risk, recover the cost of poor quality, improve communication and improve customer satisfaction. Popoola (2019) discovered that supplier audit identifies nonconformance in the manufacturing process, engineering change process, invoicing process, quality process and the supplier/shipment process which altogether influences the operational efficiency of an organization. Similarly, Qi et al. (2017) noted that supplier audits are analysis that are done to document the relationship between different companies to verify compliance of a supplier's products and processes.

Similarly, Samad et al. (2016) confirmed that supplier audit ensures operational efficiency by reducing its inventory costs to a minimum, due to increased customer responsiveness, the company or business can increase its market share in the market place, creates positive impact of the company or business in the global market place because of its partnership with the suppliers, which helps in the production of quality products and improved operations, ultimately contributes to the continuous improvements of the company's projects. Also, Gudda and Deya (2019) discovered that supplier audit enhances operational efficiency by avoiding wasted investment and customer disappointment by only choosing suppliers who can deliver as agreed, ensuring the supplier maintains high hygiene standards throughout the production process, ensuring that supplying-firm undertakes continuous improvements and operates efficiently to lower costs and determining whether the products being manufactured fulfil the correct requirements.

## 8. CONCLUSION

Empirical evidences of this study have shown that supplier development (supplier financial supports, suppliers' technical supports, early supplier involvement, supplier audit and supplier audit) is a strong determinant of manufacturing firms' operational performance. First, supplier financial support strongly determines manufacturing firms' customer satisfaction. This implies that buying-firm's effort to assist supplying-firm with finance ahead of delivery bolsters supplier development which subsequently improves customer's satisfaction. Providing supplier with required finance does not only solidify their financial status to meeting short-and-long terms obligations but also forestalls supply disruptions that could affect the buying-firm's operations.

Also, it is concluded that providing suppliers with technical support gives a manufacturing competitive advantage. In other words, this implies that providing supplying-firm with state-of-the-art infrastructure, real-time decision support and flexible customizable support structure among others,

strengthens buying-firm's supplier development which in-turn bolsters its operating capability and give them competitive advantage.

Furthermore, it is conclusive that by utilizing the knowledge and expertise of a system supplier in the realm of new product development, one significantly reduces costs. Involvement of a system supplier during the concept phase enables buying-firm to buy the right materials – on the basis of the chosen concepts – at acceptable costs

This study also concludes that supplier audit enhances operational efficiency by avoiding wasted investment and customer disappointment by only choosing suppliers who can deliver as agreed, ensuring the supplier maintains high hygiene standards throughout the production process, ensuring that supplying-firm undertakes continuous improvements and operates efficiently to lower costs and determining whether products being manufactured fulfil the correct requirements.

Lastly, it is concluded that supplier certification for bolsters buying-firms' total quality management system to ensure that a supplier's product is produced, packaged, and shipped under a controlled process that results in consistent conformance to buying-firm's requirements.

### 9. RECOMMENDATIONS

The following recommendations were made:

- i. Management of DSR is advised to support their supplying-firms with state-of-the-art infrastructure, real-time decision support and flexible customizable support structure among others, to strengthen operating capability and give them competitive advantage.
- ii. Management of DSR is advised to financially support their suppliers so as to ensure customers' satisfaction, through improve cash-flow visibility, expand suppliers' existing financial capabilities, reduced financial risk and provides liquidity to both parties, thereby strengthening their commercial relationship.
- iii. Management of DSR is advised to ensure early supplier involvement in order to ensure cost efficiency by providing buying-firm with know-how about production possibilities at early stages, allows timely identification of project risks in the realm of cost price, manufacturability and lead time and thus saving the customer time and money by preventing redesigns at later stages.
- iv. Management of DSR is advised to ensure consistent supplier audit in order to bolster operational efficiency by avoiding wasted investment, ensuring the supplier maintains high hygiene standards throughout the production process, ensuring that supplying-firm undertakes continuous improvements, operates efficiently to lower costs and determining whether products being manufactured fulfil the correct requirements.
- v. Management of DSR is advised to ensure regular supplier certification in order to encourage its customer service delivery through total quality management system to ensure that a supplier's product is produced, packaged, and shipped under a controlled process that results in consistent conformance to buying-firm's requirements.

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