ABC ANALYSIS AND PRODUCT QUALITY OF MANUFACTURING FIRMS IN NIGERIA

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ABSTRACT

The study examined ABC analysis inventory management practice and product quality of manufacturing firms, a study of De United Foods Industries Limited. The objective of the study was to investigate the effect of ABC analysis on product quality of De United Foods Industries Limited. The population of the study is 385 which consist of all the staff of inventory related departments and a sample size of 196 was selected. The study used quantitative method utilizing questionnaire to gather data from the respondents. Research data were analyzed using regression analysis. The findings indicate that there is a strong positive and significant relationship between ABC analysis on product quality of De United Foods Industries Limited ($r=0.568$; $\beta=0.447$; $p=0.000$).

Keywords: ABC Analysis; competitive Advantage; Inventory Management; Manufacturing; Product Quality.

INTRODUCTION

The manufacturing sector is the hub of a vibrant national economy. To be relevant, the sector must acquire the reputation of effectively harnessing and processing of available raw materials into valuable finished products for meaningful contribution to the GDP (Ana et al., 2014; Olanipekun et al., 2015). The importance of manufacturing sector has prompted many nations to accord more recognition to the sector due to its huge potential for high contribution to national GDP, employment generation, innovation stimulation, improvements of standard of living, and as a catalyst for rapid industrialization, among others (Sasmita & Manoj, 2018; Sunita et al., 2015). However, despite sectoral importance of manufacturing to national growth, it is of serious concern that manufacturing firms in Nigeria and most African countries are still lagging behind in terms of survival and competitive performance. Surprisingly, the sector has not attained this competitive status in Nigeria because apart from dearth of supportive infrastructural facilities, it is still exposed to stock-out of a critical inventory item, production halts, holding too much stock hence tying up capital, incurring costs in storage, spoilage, pilferage, obsolescence, lost sales which affects its competitive advantage (Agum et al., 2018).

In order to stay in the competitive market, many companies work to ensure high quality for their goods. Using quality as a tool to compete helps businesses to see quality not just as a way to solve problems and cut costs, rather as a way to satisfy customers. In addition to controlling the price product through the production of high product offered through the organization, any organization can have a greater market share, a high rate of return on investment and satisfy the customers (Salah, 2014). ABC analysis is the distribution of inventories to classifications of total annual use, so that A' items are the most valuable and are given special attention, 'B' are intermediate and 'C' are the least valuable items (Gbadamosi,

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2013). ABC analysis is a fundamental crucial management tool that enables management to put a lot of their effort into where they make the greatest or highest returns (Mwangi, 2016). Therefore, the study will investigate the effect of ABC analysis on Product Quality.

LITERATURE REVIEW

ABC Analysis

ABC analysis is a method of inventory classification consisting of segmenting items into three categories, A, B and C: A which is the most valuable items, C being the least valuable. This method aims to draw the attention of managers to the few critical ones (A-items) and not to the many trivial ones (C-items) (Joffrey & Joannes, 2012). It is also referred to as the 80/20 Pareto analysis rule, which means that 80% of inventory items need 20% of attention, while only 20% of attention is required for the remaining 80% of items. According to Ronald (2004) as cited in Akinlabi (2017), in aggregate inventory management, ABC is a common practice for differentiating items into a limited amount of classes and then applying a different inventory control policy for each class/group. This is sensible because, in terms of market share, profitability, sales or competitiveness, not all goods are of equal value to a firm. Inventory service objectives can be realised with lesser inventory levels by applying inventory policy selectively to these different groups, and with a single strategy applied together to all products.

Through the use of ABC Analysis, a variety of advantages can be achieved. One of them entails better management of the company's high priority inventory. The most critical items that assist in overall inventory valuation or overall material use are supported by close and strict supervision. This approach also helps to minimize clerical costs by developing a scientific system of managing inventory. It is also notable that this strategy also helps to keep stock turnover at a comparatively higher level and ensures that storage costs are minimized. The company is still protected from stock-outs by helping to maintain adequate safety inventory by using this process (Rutendo, 2016). On the other hand, some of the drawbacks of using this method are that a number of other measures have to be in place for the success of this analysis, which many small businesses may not be able to implement. A good inventory codification system and a proper standardization of inventory in stock are some of the necessary measures. The creation of this infrastructure requires substantial resources. It is also worthy of note that the analysis relies on the monetary value of the stock item in use, thus ignoring other significant variables (Rutendo, 2016).

Product Quality

Quality can be defined in four groupings namely conformity to requirements, value for money, meeting of customer's requirements and excellence (Ling & Shaheen, 2018). Product quality is the capacity of a product/good to meet or surpass the expectations of the customer (Waters & Waters, 2008). The definition commonly used defines quality as the perception of customers about the product and excellence of service. In current competitive environment, quality is the vital requirement to the success and survival of an organization. Concentrated global competition has emphasized the growing significance of quality (Ling & Shaheen, 2018). Product quality appraisal is usually centred on product perception of customers and product

expectation. If the products produced by the organisation meet the customer lowest needs, the customer will be contented with the product quality.

An organization delivering high-quality products can charge premium prices and consequently upsurge its profit margin on sales and return on investment (Atnafu & Balda, 2018). Organizations focused on the quality of products meet expectations and achieve customer satisfaction through the quality the product design as well as the quality of service. In order to remain in the competitive market many organizations make effort to attain high quality products. The use of quality as a tool for competition necessitates organizations to see the quality not just as a way to solve problems and minimize costs, but also as a means to satisfy customers. Through the delivery of high quality products the organization offers, any organization in addition to control the prices of products can realise a larger market share, a high returns on investment and attain customer satisfaction (Salah, 2014).

METHODOLOGY

The population of the study is 385 which consist of all the staff of inventory related departments such as quality assurance department, production department, purchase department, warehouse, account department and production planning and inventory control (PPIC) department. The sample size of 196 was selected using the Gill et al. (2010) statistical formula for calculating minimum sample proportion. Descriptive statistics in the form of frequencies and percentages was used for data presentation in this study, regression analysis was used to analyse data got from respondents.

One hundred and ninety-six (196) copies of the questionnaire were administered to staff of the inventory related departments. Responses to the statements will follow the four (4) point likert scale (Strongly agree, Agree, Disagree and Strongly Disagree). The reliability of the research instrument was based on the internal consistency benchmark of 0.7 and above of the Cronbach Alpha value. The Cronbach Alpha value was reported at 0.731, which indicates a good internal consistency.

Table 1 shows the respondents gender distribution. Out of the 128 total respondents, 106(82.8%) respondents were male while 22(17.2%) respondents were female. The data shows that out of the 106 total respondents, 14(10.9%) respondents were less than 25 years, 98(76.6%) respondents were within the age group of 25-45, 16(12.5%) of them were above 45 years. It was observed that out of 128 total number of respondents, 24(18.8%) respondents had SSCE/NECO, 92(71.9%) had HND/First degree, 12(9.4%) respondents had other qualifications. The data shows that out of the 128 total respondents, 48(37.5%) respondents single, while 80(62.5%) respondents were married. The data depicts that 38 respondents (29.7%) had been working in the company between 1-3 years, 32 respondents (25%) had been working in the company between 4-6 years, 24 respondents (18.8%) had been working in the company between 7-10 years, while 34 respondents (26.6%) had been working in the company above 10 years.

Data Analysis

Table 2 shows the response of respondents when they were asked questions depicting the use of ABC analysis in De United Foods Industries Limited. From the table above, it was revealed that 16(12.5%) and 16(12.5%) of the respondents strongly disagreed and disagreed that all items in their stores are classified according to their economic value and importance; while

56(43.8%) and 40(31.3%) of the respondents agreed and strongly agreed with the statement. This implies that majority of the respondents' which consist of 96(75.1%) affirmed that all items in their stores are classified according to their economic value and importance.

TABLE 1 DEMOGRAPHIC PROFILE OF RESPONDENTS			
Variable	**Response category**	**Frequency (N)**	**Percentage (%)**
Gender	Male	106	82.8
	Female	22	17.2
	Total	128	100.0
Age group	Below 25	14	10.9
	26--45	98	76.6
	Above 45	16	12.5
	Total	128	100.0
Highest Educational qualification	NECO/SSCE	24	18.8
	HND/First Degree	92	71.9
	Others	12	9.4
	Total	128	100.0
Marital status	Single	48	37.5
	Married	80	62.5
	Others	0	0
	Total	128	100.0
Department	Production	38	29.7
	Purchase	14	10.9
	Quality Assurance	10	7.8
	Warehouse	38	29.7
	Account	12	9.4
	PPIC	2	1.6
	Others	14	10.9
	Total	128	100.0
Years working in the Company	1-3	38	29.7
	4-6	32	25.0
	7-9	24	18.8
	10 above	34	26.6
	Total	128	100.0

Source: Field survey, 2020

However, 8(6.3%) and 6(4.7%) of the respondents strongly disagreed and disagreed to the statement that the firm divides inventory into different classifications based on priority while 72(56.3%) and 42(32.8%) agreed and strongly agreed with the statement. This implies that majority of the respondents' which consist of 114(89.1%) ascertained that the firm divides inventory into different classifications based on priority.

Meanwhile, 4(3.1%) and 16(12.5%) of the respondents strongly disagreed and disagreed with the opinion that the firm uses ABC analysis to assess the value/priority of items in inventory; while 68(53.1%) and 40(31.3%) agree and strongly agreed with the statement respectively. This implies that majority of the respondents which consist of 108(84.4%) established the firm uses ABC analysis to assess the value/priority of items in inventory.

Moreover, 4(3.1%) and 20(15.6%) of the respondents strongly disagreed and disagreed with the statement that the firm uses inventory classification system to allocate time and money

in inventory management, while 78(60.9%) and 26(20.3%) agreed and strongly agreed with the statement respectively. This implies that majority of the respondents which consist of 104(81.2%) acclaimed that the firm uses inventory classification system to allocate time and money in inventory management.

The mean represent average that measures central tendency while standard deviation measures the extent of variation compared to mean. The decision rule for mean on a Likert scale of four (4) indicates that when the mean value is between 1.00-1.75 is said to be strongly disagree; the mean values between 1.76 to 2.50 is regarded as disagree, 2.51-3.25 is agree; while the mean value between 3.26-4.00 is regarded as strongly agree. The standard deviation roles states that if the ratio of the standard deviation to mean is greater than 1, it indicates high variation compared to mean but if it is less than 1, it suggests a low variation compared to mean. The average mean of the responses was 3.051 which means that majority of the respondents agree to the statements on the adoption of ABC analysis and the standard deviation of 0.797 shows a low variation of the opinions compared to mean.

S/N	Items	Frequency Distribution				Total	Mean	SD
		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**			
1	All items in our stores are classified according to their economic value and importance.	16 12.5%	16 12.5%	56 43.8%	40 31.3%	128 100%	2.938	0.970
2	The firm divides inventory into different classifications based on priority.	8 6.3%	6 4.7%	72 56.3%	42 32.8%	128 100%	3.156	0.778
3	The firm uses ABC analysis to assess the value/priority of items in inventory.	4 3.1%	16 12.5%	68 53.1%	40 31.3%	128 100%	3.125	0.742
4	The firm uses inventory classification system to allocate time and money in inventory management.	4 3.1%	20 15.6%	78 60.9%	26 20.3%	128 100%	2.984	0.698
Average							3.051	0.797

TABLE 2
ITEMS FOR THE MEASUREMENT OF ABC ANALYSIS

Table 3 shows the response of respondents when they were asked questions depicting the product quality of De United Foods Industries Limited. From the table above, it was revealed that 0(0%) and 4(3.1%) of the respondents strongly disagreed and disagreed that the firm offers high quality products and services to its customers; while 58(45.3%) and 66(51.6%) of the respondents agreed and strongly agreed with the statement. This implies that majority of the respondents' which consist of 124(96.9%) affirmed that the firm offers high quality products and services to its customers.

TABLE 3
ITEMS FOR THE MEASUREMENT OF PRODUCT QUALITY

S/N	Items	Frequency Distribution				Total	Mean	SD
		Strongly Disagree	Disagree	Agree	Strongly Agree			
1	The firm offers high quality products and services to its customers.	0 0%	4 3.1%	58 45.3%	66 51.6%	128 100%	3.484	0.561
2	Customers buy our products because of its quality.	0 0%	2 1.6%	60 46.9%	66 51.6%	128 100%	3.500	0.532
3	The firm ensures inventory meets quality standards.	4 3.1%	2 1.6%	52 40.6%	70 54.7%	128 100%	3.469	0.687
4	The firm offers unique products features that customers are willing to paying a higher price for.	2 1.6%	10 7.8%	60 46.9%	56 43.8%	128 100%	3.328	0.689
Average							3.445	0.617

However, 0(0%) and 2(1.6%) of the respondents strongly disagreed and disagreed to the statement that customers buy their products because of its quality while 60(46.9%) and 66(51.6%) agreed and strongly agreed with the statement. This implies that majority of the respondents' which consist of 126(98.4%) ascertained that customers buy their products because of its quality.

Meanwhile, 4(3.1%) and 2(1.6%) of the respondents strongly disagreed and disagreed with the opinion that the firm ensures inventory meets quality standards; while 52(40.6%) and 70(54.7%) agree and strongly agreed with the statement respectively. This implies that majority of the respondents which consist of 122(95.3%) established the firm ensures inventory meets quality standards.

Moreover, 2(1.6%) and 10(7.8%) of the respondents strongly disagreed and disagreed with the statement that the firm offers unique products features that customers are willing to paying a higher price for, while 60(46.9%) and 56(43.8%) agreed and strongly agreed with the statement respectively. This implies that majority of the respondents which consist of 116(90.7%) acclaimed that the firm offers unique products features that customers are willing to paying a higher price for.

The mean represent average that measures central tendency while standard deviation measures the extent of variation compared to mean. The decision rule for mean on a Likert scale of four (4) indicates that when the mean value is between 1.00-1.75 is said to be strongly disagree; the mean value between 1.76-2.50 is regarded as disagree, 2.51-3.25 is agree; while the mean value between 3.26-4.00 is regarded as strongly agree. The standard deviation roles states that if the ratio of the standard deviation to mean is greater than 1, it indicates high variation compared to mean but if it is less than 1, it suggests a low variation compared to mean. The average mean of the responses was 3.445 which means that majority of the respondents strongly

agree to the statements on the product quality of De United Foods Industries Limited. The standard deviation of 0.617 shows a low variation of the opinions compared to mean.

Hypothesis

H0: ABC analysis has no significant effect on product quality of De United Foods Industries Limited.

TABLE 4
DATA ANALYSIS

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	
1	0.568[a]	0.322	0.317	0.41074	

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.110	1	10.110	59.926	0.000[b]
Residual	21.257	126	0.169		
Total	31.367	127			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.081	0.180		11.563	0.000
ABC Analysis	0.447	0.058	0.568	7.741	0.000
Independent Variable: *ABC Analysis*					
Dependent Variable: *Product Quality*					

(Source: Researcher 2020)

The Table 4 reveals that a positive and strong relationship exists between ABC analysis and product quality with an R of 0.568. It also shows much of the variance in product quality is explained by ABC analysis. This is represented by R square which equals 0.322 and expressed in percentage is 32.2%. This shows that ABC accounts for 32.2% of Product quality. The ANOVA table shows that the F value is 59.926 at 0.000[b] Significance level. The implication is that ABC analysis has a significant effect on product quality ($\beta = 0.447$; $t = 7.741$; $p = 0.000$). The β 0.447 expressed in percentage as 44.7% indicate that a unit increase in ABC analysis will lead to 44.7% increase in product quality. Since the significance level of the model is less than 0.05, the null hypothesis should be rejected. It can therefore be concluded that ABC analysis has a significant effect on product quality of De United Foods Industries Limited.

FINDINGS

The findings show that a positive and strong relationship exists between ABC analysis and product quality. ABC analysis has a significant effect on product quality of De United Foods Industries Limited. This result is consistent with the findings of Elsa & Bett (2019) which shows that a positive and significant correlation between quality control and organizational performance. The findings of Atnafu & Balda (2018) reveal that higher levels of inventory management practice can lead to enhanced competitive advantage and improved organizational performance. Also, competitive advantage can have a direct, positive impact on organizational

performance. Akinlabi (2017) inventory investment had positive and significant influence on the competitive advantage which is supported by majority of the respondents which consist of 104(81.2%) which acclaimed that the firm uses inventory classification system to allocate time and money in inventory management. The R square result show that a unit increases in ABC analysis will lead to 44.7% increase in product quality which is the major competitive advantage of De United Foods Industries Limited.

CONCLUSIONS AND RECOMMENDATION

The study concludes that ABC analysis has a positive, strong and significant effect on product quality of De United Foods Industries Limited. From the test of hypothesis, a unit increase in ABC analysis will lead to 44.7% increase in product quality. Arising from the findings of the study on inventory management practices and competitive advantage of manufacturing firms (study of De United Foods Industries Limited), some pertinent recommendations can be made. Owing to the huge sum of money firms spend on inventory, a lot of emphasis or attention needs to be given to inventory management to enable manufacturing firms achieve competitive advantage. The study recommends that De United Foods Industries Limited should maintain ABC analysis in inventory management as this has a great impact on product quality.

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