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SIX SIGMA MANUFACTURING AND PERFORMANCE OF BREWING FIRMS IN SOUTH-SOUTH, NIGERIA

Nnabuife, E [1] and Ohue Paul Itua [2]

[1]Department of Business Administration, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Anambra State; Nigeria.

[2]Department of Business Administration, College of Management and Social Sciences, Samuel Adegboyega University, Ogwa, Edo State; Nigeria.

ABSTRACT: *The broad objective of this paper is to determine the type of relationship that exists between Six Sigma Manufacturing and Performance of brewing firms in South-South, Nigeria. Specifically, this study seeks to ascertain the type of relationship between quality input and profitability of brewing firms in South-South, Nigeria. The study was anchored on The Theory of Constraint (TOC) propounded by Goldraft (1984). Expost-facto research design was adopted for the study. Secondary data extracted from the annual financial reports of the three studied brewing firms (Guinness Nigeria Plc, Champion Brewery and International Brewery Plc.) were used for the study with regression analysis applied on the collected data. Results obtained from the test of the hypothesis revealed that a significant positive relationship exists between quality input and profitability since (F-statistic = 57.11217; R-squared = 0.815; P <.05). Based on the findings, the researchers concluded that there exists a strong significant positive relationship between Six Sigma Manufacturing and Performance of brewing firms in South-South, Nigeria.*

KEYWORDS: six sigma manufacturing, quality input, organizational performance, profitability.

INTRODUCTION

In the last few decades, Six Sigma has become one of the most successful improvement model for many manufacturing firms across the globe (Okafor, Agbaeze, Ekoja & Obamen, 2018). Six Sigma Manufacturing methodology was officially launched at Motorola in 1986 to sustain final output level by focusing on acquiring significantly higher conformance levels (Arnheiter & Maleyeff, 2015). Six Sigma Manufacturing technique assisted Motorola in selling their ideas at a time and aided them in obtaining the prestigious 1988 Malcolm Baldrige National Quality Award (Snee, 2010). Basically, Six Sigma Manufacturing methodology is considered as a technique applied to manufacturing or production firms so as to ensure little or no compromise in the production process. The earlier implementation of Six Sigma in a manufacturing firm, was to make the firm produce the exact customers' stipulation in terms of products, quality and quantity with minimal possible waste on the part of a manufacturing firm. The idea of Six Sigma Manufacturing methodology is to remove variations from the manufacturing process and strive to manufacture

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defect-free products. It is considered a manufacturing strategy and a technique that combines statistical and business methodologies which hinges on continuous and steady improvements to reduce productions costs, improve customer satisfaction and to predictably manufacture quality goods and services (Noone, Namasivayam & Tomlinson, 2010).

Six Sigma toolbox comprises of the seven design tools, the seven statistical tools, the seven project tools, the seven Lean tools, the seven customer tools, the seven quality control tools and the seven management tools (Snee, 2010). Interestingly, in today's business world, Six Sigma has been successfully applied in most advanced nations in the area of manufacturing/production, finance, healthcare, banking and many other company processes. Studies has shown that an application of Six Sigma Manufacturing methodology could impact the performance level of an organization (Natarajan & Morse, 2009) which could be evident in the kind of service or product rendered by an organization that applies Six Sigma Manufacturing methodologies to their operations. Evidence from studies of scholars like Ecoch (2013); Alexander, Jacqueline and Jacqueline (2013) in African countries have shown that the adoption of Six Sigma methodology has been in practice for over two decades. Alexander, Jacqueline and Jacqueline (2015) argued that some organizations in the Eastern part of Africa shifted from TQM to Six Sigma after they identified the effect of Six Sigma Manufacturing methodology on performance of manufacturing firms in advanced countries. Ignatio and Charles (2015) observed that some manufacturing firms in South Africa adopted Six Sigma Manufacturing methodology when they noticed that some successful multinational manufacturing firms in South Africa have inculcated Six Sigma Manufacturing (SSM) methodologies into their operations.

In spite of the successful application of Six Sigma Manufacturing methodology in advanced nations of the world and some parts of Africa, evidence from studies such as that of Okafor, Agbaeze, Ekoja and Obamen (2018) have shown that most Nigerian manufacturing firms are either not fully implementing Six Sigma Manufacturing methodology or are conversant with only techniques such as Total Quality Management. A lack of understanding of the benefits of SSM has led to outcomes below expectation in most Nigerian manufacturing firms. The foregoing gives credence to an examination of the relationship between Six Sigma Manufacturing (SSM) and performance of brewing firms in South-South, Nigeria.

The failure of some Nigerian manufacturing firms to adopt a unique manufacturing technique was observed by the researchers and these firms have failed to adopt a manufacturing methodology centered on quality assurance. This have also led to the failure to measure up with their western counterparts. The Nigerian brewing industry is not left out as the failure of the management team and specifically the production department of these firms to keep themselves abreast with recent or current production methodologies could affect the performance level of these brewing firms. The researchers observed that quality raw-materials is substituted with sub-standard raw-materials

by some managers of these brewing firms; which means having poor production inputs. This could affect the acceptability of the products of these manufacturing firms and by extension their profit level. Though scholars like Enoch (2013) had carried out an empirical study to examine the effect of Six Sigma Methodologies on Organizational Profitability among the Manufacturing SMEs in Nigeria, Adan and Mohammed (2009) examined Six Sigma Manufacturing and performance of a semiconductor company in Palestine have recommended a strict implementation of Six Sigma Manufacturing to the operations of production firms, most Nigerian manufacturing firms and particularly the brewing industry have failed to inculcate SSM methodologies in their manufacturing processes. The foregoing creates a lacuna in literature and therefore gives credence to the study of Six Sigma Manufacturing (SSM) and Performance of brewing firms in South-South, Nigeria. Specifically, this study seeks to ascertain the extent of relationship that exists between quality input and profitability of brewing firms in South-South, Nigeria.

Justification for the Study

This study is apt as there seems to be limited study on the study area in Nigeria. It will give the studied brewing firms an insight on the effect Six Sigma Manufacturing (SSM) could have on the performance level of a manufacturing. This study will also be beneficial to other manufacturing firms in Nigeria and other climes as it will give them a better understanding of the effect Six Sigma Manufacturing (SSM) could have on their performance. Lastly, this study seeks to contribute to existing literature on the subject area.

LITERATURE/THEORETICAL UNDERPINING

Six Sigma Manufacturing

Montgomery (2010) concede that Six Sigma Manufacturing is an organized and systematic method for process enhancement, product and service development and reduction of defects in the manufacturing process. Snee (2010) opines that since the introduction of Six Sigma Manufacturing methodology at Motorola in the 1980s, a lot of organizations including General Electrics, Honeywell, Sony, Caterpillar, and Johnson Controls have adopted Six Sigma and obtained substantial benefits. Morgan and Brenig-Jones (2009) contend that Six Sigma Manufacturing methodology is used to improve the manufacturing process and products offered to customers. Six Sigma as a management philosophy instructs management to begin by identifying the 20 or 30 most important processes in manufacturing process. Next, management measures the current sigma performance of each of these processes. Some processes may even be lower than two Sigma. Once management has acknowledged the processes and personally been involved in measurement of their current performance, they then identify the lowest performing processes that have the most impact on the company's operations (Cross, 2019). Snee (2010) is of the opinion that Six Sigma is viewed today as a disciplined, systematic, measurement-based and data-driven approach used to reduce variation in the manufacturing process. The idea of Six Sigma is to remove deviation or

variation from the manufacturing process and strive to produce defect-free products. It is considered a manufacturing strategy and a technique that combines statistical and business methodologies which hinges on continuous and steady improvements to reduce production costs, improve customer satisfaction and to predictably produce or manufacture quality goods and services (Noone, Namasivayam & Tomlinson, 2010). The Six Sigma toolbox comprises of the seven design tools, the seven statistical tools, the seven project tools, the seven Lean tools, the seven customer tools, the seven quality control tools and the seven management tools (Snee, 2010). The emphasis of this study is quality control tools (quality input). A review of related literature shows that Six Sigma Manufacturing technique is a manufacturing tool that could ensure quality in the production process.

Quality Input

Solving quality-related problems at the source is a concept which places the responsibility on the employees to identify, restore and eliminate deficiency during each operation (Liker, 2014). Evans and Lindsay (2015) see quality input as a process which ensures that components which pass from one process to the next conform to specification. From an operational perspective, Santos, Wysk and Torres (2016) claim that the implication of "on line" inspection could result in employees making subjective judgments and unintentionally tolerating items that should be rejected. Therefore, as a preparatory step to "on line" inspection Olivella, Cuatrecasas and Gavilan (2008) suggest that the organization equip employees with a great body of knowledge on how to solve quality-related problems at the source since they witness production events first hand. In agreement with these views, Lee and Peccei (2008) averred that the traditional organizational perspectives require specialists to solve quality-related problems; however, this has changed over the years in best practice organizations where employees on the shop floor have taken the responsibility for product improvement. To add to another dimension of solving quality related problems at the source, many authors share a similar opinion that "Poka-Yoke" devices are a pattern of source inspection that are commonly used to identify and eliminate deficiency in output (Morgan & Brenig-Jones, 2009; Evans, 2008; Schonberger, 2007; Liker, 2014). "Poka-Yoke" is a Japanese adage that means mistake proofing. Poka-Yoke is a mechanism designed to prevent deficient products from making it to the next stage (Chase, Jacobs & Aquilano ,2016). Base on the foregoing, it can be interpreted that it is practical for employees to inspect their own job as it would assist them in identifying deficiencies as they occur and prevent them if any, from moving to the next process. For the purpose of this study, the inventory in transit of the studied organizations, funds employed for plants and machinery by the studied firm and engineering spares of the studied firms were used to proxy quality input. These variables were used because the quality of a company's product could be determined by its inventory in transit, amount it spends for plant and machinery and its engineering spares.

Organizational Performance

The performance of an organization is adjudged positive when the activities of an organization yield favourable consequences (Nwachukwu, 2006). Gregory (2015) contends that an organization is judged through several parameters. These parameters or indicators help managers determine how well an institution is performing and areas where improvements are needed. Continuous improved performance is the intention of any organization because only through performance, organizations are able to grow and progress. Griffin (2005) suggested that organizational performance is described as the extent to which the organization or business entity is able to meet the needs of its stakeholders and its own need for survival. Iravo (2011) is of the opinion that organizational performance level is used to ascertain how ell an organization has attained its set objectives. The definitions of the concept by different researchers show that organizational performance is all about the economic well-being of an undertaking in relation to its competitors. Wishart (2019) contends that some performance parameters or indicators used for a typical manufacturing firm are product availability, sales volume, labour cost, down time, material cost, reject/scrap, quality, profitability, shareholders' dividend, organizational innovation and turn-over. This study used profitability as a measure of the organizational performance indicator.

Profitability

Maximization of profit is a very crucial aim for a company to remain in business and to withstand competition from firms operating in similar industry. It is a major pre-requisite for long-term survival and growth of a business as well as a key pre-condition for the attainment of other financial aim of a business establishment (Gitman & Zutter, 2012). Profitability is a core measure of the performance of a business and It constitutes an essential ingredient of its financial reporting. It reveals the firm's ability and capability to generate earnings at a rate of sales, level of assets and stock of capital in a specific period of time (Margaretha & Supartika, 2016). Consequently, firms' profitability and modalities for improving it have generated serious debates in the literature and have remained topical in the sphere of economics, finance, auditing and management. Profitable firms create value, hire people, tend to be more innovative, more socially responsible and are beneficial to the entire economy through payment of taxes. High rate of performance of firms indeed contribute effectively to income generation and overall deployment of an economy (Olutunla & Obamuyi, 2008; Lazar, 2016). An examination of the determinants of the profitability of brewing corporations in Nigeria is apt and expedient for a number of reasons. This gives confidence to this study.

Theoretical Framework

This study is anchored on The Theory of Constraint. The Theory of Constraint (TOC) is an overall management philosophy popularized by Goldraft (1984) in his book titled 'The Goal''. He is of the opinion that a specified objective by management of organizations could aid everyone work towards the performance of the stated entity (Goldraft, 2009). An earlier propagator of a similar

concept was Wolfgang (1963) with his publication on Power Oriented Management Theory (Linhares, 2009). The theory is credited to Goldraft because his concept made the idea popular. The underlying presupposition of the theory is that organizational performance level could be measured by the variations of three variables: output, operational expense and inventory. Inventory is all the investment made on raw materials and input to be transformed, operational expense is all the investment made on equipment and partly used for the transformation of input into output, output is the finished product sold to customers (Steyn, 2010). Before the objective of acceptable output can be attained, the stipulations to be met are safety of equipment, quality of products, legal obligations and regular assessment of output, operational expenses and inventory.This theory is relevant to this study because if the production input of the studied brewing firms are of good quality, it could lead to the production of quality output. This by extension could impact the profitability of the studied brewing firms.

Empirical Review

Enoch (2013) carried out an empirical study to examine the effect of Six Sigma Methodologies on Organizational Profitability among the Manufacturing SMEs in Nigeria. The population of the study contained 450 manufacturing SMEs with 2250 employees. The study sample is 225 MSMEs with total 1026 employees selected randomly. The study used structured questions to collect data and a total 1002 copies of questionnaire duly filled were returned. The study used Pearson Product Moment Correction (PPMC) Coefficient to analyze the collected data. Findings revealed a relationship between Six Sigma Methodology (quality input) and profitability of the studied manufacturing SMEs.

Ariguzo, Amos, Egwakhe and Adefulu (2019) assessed the effect of Lean Manufacturing System on profitability of the Nigerian food and beverage sub-sector. Expost-facto research design was used for the study. The study carried out a post-effect review of three determining agents of LMS (Material Leanness, Employees Leanness, and Money Leanness) on the Profit (PAT) of multinational Food and beverage corporations in Nigeria. A comparison was done amongst the three multinational firms sampled along pre-and-post acceptance of the application of lean manufacturing system. Time series data was collected for a period of 25years (1994-2018) which makes up the total number of observations. The trustworthiness or reliability of the data was anchored on the legal measure regulating the financial explanations of these firms to the Nigeria Stock Exchange Commission and the morality of the Audit Firms that certified the financial reports before public disclosure. Multiple regression analysis was used to analyze the collected data. The study found lean manufacturing (emphasis on quality) to have significantly affected profitability in Nestle and Cadbury Plc, but observed no changes in Unilever.

Adan and Mohammed (2014) examined Six Sigma Manufacturing and performance of a semiconductor company in Palestine. Survey and Expost-Facto design was used, questionnaire

and observation method was used to collect data. Questionnaire was used to elicit information from 55 respondents while 3 weeks production data was also observed by the researcher. DMAIC, Box diagram, Cause and effect matrix, ANOVA, Control chart, Histogram, Normal probability plot were used to analyze the collected data. Findings revealed reduction in the electrical failures of about 50% with better quality could impact the profitability of the organization.

Abidakun, Leramo, Ohunakin, Babarinde, and Ekundayo-Osunkoya (2014) conducted an empirical study to determine the suitability of Six Sigma method on Nigerian fabricating industry. Selected fabricating firms in Lagos, Nigeria were used for the study. Survey design was used as 75 respondents were interviewed. The study used DMAIC and control chart to identify sources and causes of waste with the goal of supplying veritable solutions. The study found a sigma level of 1.87 in the aluminum milling firm which indicated that there is room for improvement, to reduce the re-work or flaw in this firm 37.05% of total production, to 4.1% if Six Sigma method is applied. In other words, an application of Six Sigma Methodologies through ensuring quality input could impact the profitability of the organization.

Agina-Obu (2015) investigated the rate of applicability of Six Sigma in Nigerian fabrication firms using Aveon Offshore in Port Harcourt as a study case. It was a survey study. The study used a semi-structured set of questions which were drawn for in-depth interviews of twenty respondents and data obtained were analyzed using Thematic Network Analysis. The study found that a relationship exists between Six Sigma methodology and profitability.

Gap in Knowledge

None of the empirically reviewed examined Six Sigma Manufacturing as it relates to performance of brewing firms in South-South, Nigeria. Specifically, none of the empirically reviewed examined quality input as it relates to profitability of brewing firms in South-South, Nigeria. This is the gap in knowledge that this study seeks to fill.

METHODOLOGY

Expost-facto research design was used for the study. Since it aims at ascertaining the relationship between one dependent variable and two or more independent variables.

The population for the variables is made up of 13 years annual time series which spanned from 2008-2020 which the data source was only secondary drawn.

A model was developed for the secondary data variables of the study. The model adapted from the study of Ariguzo, Amos, Egwakhe and Adefulu (2019) was used for the representation of the selected variables for hypotheses 4 and 5. It is thus;

$$PAT = \beta 0 + \beta 1\ COSA + \beta 2\ TOINV + \beta 3\ NOE \quad (3.1)$$

Where:

PAT = Profit after Tax
COSA = Cost of Sales
TOINV = Total Inventory
NOE = Number of Employees
β0= Constant term associated with the regression model
β1 = coefficient of cost of sales
β2 = coefficient of total inventory
β3 = coefficient of number of employees

$$PAT= \beta0+\beta1COSA+ \beta2\ TOINV+ \beta3\ NOE+ei \quad (3.2)$$

A'priori expectations are:
β0>0, β1>0, β2>0, β3>0.
The model 1 was modified for the present thus:
For the variables used for the study, Total inventory is substituted with inventory in transit. Funds employed for plants and machinery and engineering parts is added to the modified variable. The model is rewritten thus;

$$PAT=\beta0+\beta1IVT+\beta2FEPM+\beta3\ ES \quad (3.3)$$

Where:
PAT = Profit after Tax
IVT = Inventory in Transit
FEPM = Funds Employed for Plants and Machinery
ES = Engineering Spares
β0= Constant term associated with the regression model
β1 = coefficient of inventory in transit
β2 = coefficient of funds employed for plants and machinery
β3 = coefficient of engineering spares

$$PAT=\beta0+\beta1lnIVT+ln\beta2lnFEPM+\beta3lnES+ei \quad (3.4)$$

A'priori expectations are:
β0>0, β1>0, β2>0, β3>0.
Where: β0=Constant term symbol.
ln=Natural logarithm.
β1, β2 and β3 are all parameters of the independent variables
e=error term.
The annual financial reports of the studied firms were carefully observed by the researcher. Also, Mean and Regression analysis were used to analyze the data. This was aided by SPSS Version 20 and E-views 10. The level of significance was 5% while a 95% confidence level was adopted.

RESULTS AND FINDINGS

Descriptive Statistics

(i) What is the extent of relationship between quality input and profitability of brewing firms in South-South, Nigeria?

Table 1: Cumulative Descriptive Statistics for the Three Studied Brewing Firms

	PAT	LNIVT	LNFEMP	LNES
Mean	7.821507	6.944896	5.676108	3.856786
Median	3.712404	5.808227	5.143508	3.259889
Maximum	3.264210	6.146351	7.803308	7.379603
Minimum	1.341989	4.511380	4.060130	3.497631
Std. Dev.	1.072209	1.380652	1.334108	0.275937
Skewness	-0.337072	-0.273617	-0.650240	-0.629900
Kurtosis	1.479630	1.536698	1.687420	1.867302
Jarque-Bera	1.382999	1.220358	1.707057	1.435049
Probability	0.050825	0.043254	0.225909	0.187959
Sum	75.78341	120.3874	62.01604	46.28143
Sum Sq. Dev.	38.83120	8.104513	31.94317	9.705413
Observations	13	13	13	13

The table above shows the descriptive statistics of the variables of model one for the three (3) studied brewing firms. The values of the mean and median lied between maximum and minimum values for average. This implies that the data point for each of the selected series are evenly spread. Hence, there are no outliers. The coefficient of skewness for PAT, LNIVT, LNFEMP, NES are moderately skewed. Hence, PAT, LNIVT, LNFEMP, LNES all have a distribution curve that is moderately symmetrical. The kurtosis indicated that the coefficient of kurtosis for each of the series are either approximately 2 or below. The probability values for the Jarque Bera statistic show that each of the selected series had a value that is greater than 0.05. This signifies that they are all normally distributed at 0.05 level. Hence, all the selected series are normally distributed.

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Unit Root Test Using Phillips Perron Analysis

Unit Root Test for Variables of Hypothesis Four at 5 % Critical Value

Table 2: Cumulative Unit Root Test for the Three Studied Brewing Firms

Variable	PP at Level and 5% Value	PP at First Difference and 5% Value	Remark
PAT	-0.972692(-3.212696)	-5.828944(-3.320969)	Stationary at first diff.
LNIVT	-3.065191(-3.144920)	-6.008957(-3.175352)	Stationary at first diff.
LNFEMP	-0.295376(-3.144920)	-3.777360	(-3.175352) Stationary at first diff.
LNES	-0.377589(-3.144920)	-3.839403 (-3.175352)	Stationary at first diff.

The Phillips-Perron statistic shows that for the three studied brewing firms, PAT is stationary at first difference since PP statistics at first difference (-5.828944) is greater than critical value at 5% (-3.320969). LNIVT is stationary at first difference since PP statistics at first difference (-6.008957) is greater than critical value at 5% (-3.175352). LNFEMP is stationary at first difference since PP statistics at first difference (-3.777360) is greater than critical value at 5% (-3.175352). LNES is stationary at first difference since PP statistics at first difference (-3.839403) is greater than critical value at 5% (-3.175352).

AEG Co-Integration Test Result

Co-integration Test of the Studied Variables

Table 3: Cumulative Co-Integration Analysis

Variable	ADF Statistic	Critical Value @ 5%	Remark
ECM Resid	-4.699032	-3.519595	Stationary

Since the Augumented Dicky Fuller (ADF) statistic value (-4.699032) is greater than critical value (-3.519595) @ 5%, it shows that the data is stationary.

Test of Hypothesis

Research Hypothesis

(i) Ha: There is a significant relationship between quality input and profitability of brewing firms in South-South, Nigeria.

Table 4: Cumulative Regression Output of Formulated Hypothesis

Dependent Variable: PAT				
Method: Least Squares				
Date: 07/10/21 Time: 19:12				
Sample: 1 13				
Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.053201	0.243502	7.249914	0.0267
LNIVT	0.826340	0.332518	6.138396	0.0433
LNFEMP	0.752653	0.147722	14.65304	0.0356
LNES	0.813593	0.226165	8.036587	0.0302
R-squared	0.815070	Mean dependent var		16.82103
Adjusted R-squared	0.802722	S.D. dependent var		5.073510
S.E. of regression	4.432103	Akaike info criterion		7.761321
Sum squared resid	2215.520	Schwarz criterion		6.422363
Log likelihood	-282.5720	Hannan-Quinn criter.		5.270215
F-statistic	57.11217	Durbin-Watson stat		1.612239
Prob(F-statistic)	0.000041			

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The coefficient of the constant is 2.053201. This implies that when all the explanatory variables are zero, the dependent variable (PAT) will be approximately 2.053201. Also, its probability value of 0.0267 shows that the result is statistically significant. The results indicate a direct relationship between inventory in transit (LNIVT) and profit after tax (PAT) of the studied brewing firms. This implies that a unit increase in LNIVT would make PAT to increase by 0.826340. The probability value of 0.0433 implies that LNIVT and PAT are statistically significant at 0.05 level. The results indicate a direct relationship between funds employed for plants and machinery (LNFEMP) and profit after tax (PAT) of the studied brewing firms. This implies that a unit increase in LNFEMP would make PAT to increase by 0.752653. The probability value of 0.0356 implies that LNFEMP and PAT are statistically significant at 0.05 level. The results indicate a direct relationship between engineering spares (LNES) and profit after tax (PAT) of Champion Brewery. This implies that a unit increase in LNES would make PAT to increase by 0.813593. The probability value of 0.0302 implies that LNES and PAT are statistically significant at 0.05 level.

DISCUSSION

Findings obtained from a test of the formulated hypothesis revealed a positive relationship between quality input and profitability of the studied brewing firms. This corroborates the study of Enoch (2013) who carried out an empirical study to examine the effect of Six Sigma Methodologies on Organizational Profitability among the Manufacturing SMEs in Nigeria. Findings revealed a relationship between Six Sigma Methodology (quality input) and profitability of the studied manufacturing SMEs. The study of Ariguzo, Amos, Egwakhe and Adefulu (2019) who assessed the effect of Six Sigma Methodology on profitability of the Nigerian food and beverage sub-sector also aligns with findings obtained from a test of the formulated hypothesis. The study found Six Sigma Methodology (emphasis on quality) to have significantly affected profitability in Nestle and Cadbury Plc, but observed no changes in Unilever. The study of Adan and Mohammed (2009) who examined Six Sigma Manufacturing and performance of a semiconductor company in Palestine is also in tandem with findings obtained from the study. Findings revealed reduction in the electrical failures of about 50% with better quality could impact the profitability of the organization.

IMPLICATION TO RESEARCH AND PRACTICE

The implication of this study to research and practice is that this study will help management of the studied brewing firms to have an insight of the effect an adoption of Six Sigma Manufacturing (SSM) methodologies could have on their operations. Also, this study will give researchers, managers and captains of industry an idea of what Six Sigma Manufacturing is all about.

CONTRIBUTION TO KNOWLEDGE

This study contributes to the existing body of knowledge as it broadens the idea of Africans and specifically Nigerians on the subject matter. This study makes available empirical studies on Six Sigma Manufacturing (SSM) as it relates to the performance of a production firm. This is because there are limited studies in this area by Africans.

CONCLUSION

Findings of the study revealed that a relationship exists Six Sigma Manufacturing and performance of brewing firms in South-South, Nigeria. Specifically, findings of the study revealed a relationship between quality input (having the right quality of inventory in transit, budgeting the right amount for plant and machinery and having the right quality of engineering spares) and the profitability of (Guinness Nigeria Plc, Paphod Brewery and Champion Brewery).

FUTURE RESEARCH

Empirical studies revealed that there exist inadequate studies on Six Sigma Manufacturing as it relates to the performance of some Nigerian industries. Some industries where Nigerian scholars need to carry-out a related study are:

1. The Nigerian automobile industry.
2. The Nigerian Textile industry.
3. The Nigerian Plastic industry.
4. The Nigerian Pharmaceutical industry.
5. The Nigerian Cosmetic industry.
6. The Aluminium industry.

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