Lean Management Practices and Organizational Performance: An Experience from Brewing Plants in South East, Nigeria

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Abstract

The Study focuses on effect of Lean Management practices on the Performance of Brewing plants in South East, Nigeria. Specifically the study aimed to pursue the following objectives to determine the effect of continuous improvement on Product Quality in of Brewing Plants in South-East, Nigeria, ascertain the nature of correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria and Identify the influence of Just-In-Time delivery practice on Customer Satisfaction of Brewing plants in South-East, Nigeria. The study had a population size of (1528) of employees of the selected first banks, and sample of 431 were derived using Cochran's sample size determination formula. The total number of 431 copies of the questionnaire was distributed while 401 copies were properly filled/returned & used while 30 copies were not properly filled. Descriptive Survey research design was used for the study. three hypotheses were tested using Pearson product moment correlation coefficient and simple linear regression tool. The findings indicated Continuous improvement had significant effect on Product Quality of the Brewing Plants of South-East, Nigeria ($r = 0.555$; $F = 177.326$; $t = 13.316$; $P < 0.05$) .There was a significant positive correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria ($r = 0.957$, $P<.05$). Just-In-Time delivery practice had significant effect on Customer Satisfaction of the Brewing Plants in South-East, Nigeria ($r = 0.869$; $F= 1227.494$; $t = 35.036$; $P <0.05$). The study recommends that Brewing plants in South East, Nigeria should embrace Continuous improvement which will help to maintain the realms of quality on a consistent and continuous basis, also enable firms to conduct market research and study on a regular basis having a drive in offering the products that stand as a testimony to the quality and its principles.

Keywords: lean management; continuous improvement; supply chain; just-in-time delivery practice and brewing plants

Introduction

The concept of Lean Management can be traced as far back in history as the industrial revolution when machines, having shorter through-put times, replaced humans, (Hobbs, 2004). Lean, also referred to as Lean Management, Lean Manufacturing, Lean Enterprise, or Lean Production, are a powerful set of tools and techniques that many companies choose to implement and sustain for increasing the efficiency of production and the overall customer value while at the same time eliminating waste. Waste is anything that does not add value but adds costs to a company. Typically, seven wastes have been identified in the practice of Lean management. These include: waiting, transportation, over-production, inventory, movement, over-processing, and re-work (Drew, McCallum, & Roggenhoffer, 2004).

Lean Manufacturing is considered as a rapid growing manufacturing culture. The manufacturing companies are facing cut throat competition and so are compelled to continuously perform better than their competitors. Hence the organizations are growing at a faster pace, to enhance their position in the competitive world. Industrial organizations have to adopt the new philosophies like lean. Lean Manufacturing may be defined as the technique which is used for the continuous elimination of all types of waste in the production process to improve efficiency. Management strategies and philosophies are always difficult and uncertain because change is inevitable and the companies should devise it as per the customer's requirement. The primary competitive measure of lean is "ability to respond to the customer and satisfy his requirements by making the process of the production efficient and waste free (Akhil, 2014).

Lean production is focused on identifying and eliminating non value activities in products and services in order to create value to customers. Lewis (2000) emphasize that Lean is considered a set of management principles for production with the aim of reducing waste. Lean involves different techniques of design, such as leadership to direct the process that involves multi-skilled employees; teamwork to assign workers from different functions in groups; communication to resolve critical design trade-offs and prioritize resources; and simultaneous development that involves a process with less tools, inventory and human resources (Womack, Jones and Roos, 1990).

Lean concept is a way to identify where the value is in the process, eliminate the waste within the process and create value to the customer. This concept shows that Lean is applicable in any organization, since the goal of organization is to create value to the demands of the customer (Piercy and Rich, 2009). One development of Lean beyond manufacturing was application of Lean in the supply chain management. This helped the organizations to develop closer relationship with suppliers by sharing more information, increasing innovation and lowering the costs (Piercy and Rich, 2009).

Lean manufacturing can be best explained as eliminating waste in a production process (Womak and Jones, 1996). Anything (process or product tangible and

intangible) that does not add value to the end product is called waste (Henderson and Larco, 2003). Essentially, lean manufacturing seeks to produce a product that is exactly what the customer wants at right time, minimizing all non-value added activities in the production (Womack and Jones, 1994). When the time comes to begin the transformation to lean, management will need to get people together and making them aware what is going to happen, and what is expected (Henderson and Larco, 2003). The lean transition is, an organizational culture transition to manage lean, specifically during the initial phases, is more about managing the change process than managing lean tools and techniques (Csokasy and Parent, 2007). Lean production is a socio-technical system (Shah and Ward, 2007), which is viewed as a philosophy that takes care of both technical and cultural aspects (Bhasin and Burcher, 2006).

Brewing plants have shown significant growth through increasing productivity and product quality while reducing product lead times utilizing variety of strategies which are based on technology, employees, process, product, material and management (Kumar 2006). Improvements are achieved through process management strategies such as reduction of human efforts, space, engineering hours, lead times and inventory while increasing the quality, product variety and the flexibility of manufacturing operations (Diekmann, at al 2004). Different philosophies were also introduced to the manufacturing industry, namely total quality control (TQC), Continuous improvement (CI), theory of constraints (TOC), just-in-time (JIT), lean manufacturing, total productive maintenance (TPM) and six sigma. A critical review on these strategies by Stamm, Neitzert, Singh, , (2009), concludes that aforementioned strategies have a common core aim of eliminating waste or variability using different approaches. Furthermore, Hines,, Holweg, and Rich, (2004),stated that the other manufacturing strategies can easily be integrated into lean without contradicting the strategic objective of lean, to provide customer value.

Heightening challenges in today's global competition have prompted many Brewing plants to adopt new manufacturing management strategies in order to enhance the firms' efficiency and competitiveness. Brewing plants have taken lean manufacturing system as a great management tool and many of them have adopted lean techniques in many different forms and names. Now, LM has become a widely acceptable and adoptable best manufacturing practice across countries and industries (Holweg, 2007). The ultimate goal of a lean organization is to create a smooth and high quality organization that is able to produce finished products in line with the customers demand and in the quality looked-for with no waste (Holweg, 2007). However, in reality, many companies are not able to transform themselves to a lean manufacturing organization. Actually the transformation towards LM is filled with formidable challenges, most particularly to understand the real essence of LM concept and philosophy and also to deal with the cultural difference between organizations (Balle, 2005).

Statement of the Problem

Lean management is an essential strategy for competitiveness in a business environment with high uncertainty that requires high quality, faster delivery and lower costs. This can lead to firm performance when the firm experience dramatic improvement in labour productivity, reduction in customer lead time, cycle time and manufacturing costs

Brewing Plants in South East Nigeria face a number of challenges Such as: lack of Continuous improvement, low product quality, inefficient Supply Chain, delay in delivery time, high production costs, Low productive maintenance, drop in customer satisfaction and employee commitment which generally result in low performance. All these can be alleviated by the implementation of lean manufacturing practices. There has been considerable interest in lean philosophy by researchers especially in the manufacturing sector. However, organizations that fail to adopt lean management are bound to experience over-production, increase in defective products, high transportation cost, high inventory, and over-processing, which will lead to customer dissatisfaction and decline in market share and profitability.

Over the last few years, markets have become more competitive and global. The changing environment requires companies to be more flexible in order to face this challenge. The importance of aligning production to customer needs while still being able to efficiently manufacture good quality is rising. The perception of manufacturer's strategic role is increasing and companies start to improve their production system in terms of efficiency and effectiveness to develop competitive advantages. An approach that could help in achieving this aim is the concept of lean production which allows a company to on the one hand improve the production processes and boost flexibility. It is against this backdrop of the Challenges of the Brewing Plants and their intended performance for profit, growth and survival that the study investigated the Effect of Lean Management on the Performance of Brewing plants in South East Nigeria.

Objectives of the study

The main objective of this study is to determine the effect of Lean Management practices on the Performance of Brewing plants in South East, Nigeria. The specific objectives are to:

i. Determine the effect of continuous improvement on Product Quality in of Brewing Plants in South-East, Nigeria.

ii. Ascertain the nature of correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria.

iii. Identify the influence of Just-In-Time delivery practice on Customer Satisfaction of Brewing plants in South-East, Nigeria

Research Questions

With the above objectives in focus, the study seeks to find answers to the following questions.

i. To what extent does Continuous improvement affect Product Quality of the Brewing Plants in South-East, Nigeria?

ii. What is the nature of correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria?

iii. To what extent does Just-In-Time delivery practice influence Customer Satisfaction of Brewing plants in South-East, Nigeria?

Research hypotheses

The study have the following hypotheses

i. Continuous improvement does not have significant affect on Product Quality of the Brewing Plants of South-East, Nigeria.

ii. There is no significant positive correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria.

iii. A just-In-Time delivery practice does not have significance on Customer Satisfaction of the Brewing Plants in South-East, Nigeria.

Review of the Related Literature

Conceptual Review: Lean Concept

Liker and Wu (2006) define "lean" as "a philosophy of manufacturing that focuses on delivering the highest-quality product at the lowest cost and on time. It is a system of production that also takes a value stream focus. The 'value stream' consists of all the steps in the process needed to convert raw material into the product the customer desires.

"Shah and Ward (2007) suggest that the lean concept is a combined socio-technical system which eliminates waste by reducing the effects of external variability in a supply chain and internal variability in a production process. Sanchez and Nagi (2001) define the lean concept as an operational practice which focuses on the productive use of resources.

Lean manufacturing is a management approach that strives to make organizations more competitive in the market by increasing efficiency and decreasing costs through the elimination of non-value added steps and inefficiencies in the process (Sohal and Egglestone, 1994; Garza-Reyes, Oraifige, Soriano-Meier, Forrester and Harmanto, (2012)).

Lean Manufacturing may be defined as manufacturing philosophy which employs a set of tools and techniques responsible for the continuous elimination of all types of waste in the production process. Lean means "Reduce the Waste". Waste in industry is defined as "anything that does not add any value to the end product from customers perspective". The goals in implementing the Lean Manufacturing are lower production costs; increased output and shorter production lead times.(Mekongs capital review, 2004)

Continuous Improvement and Product Quality

Continuous improvement is a philosophy which focuses on the work process and people, with the major concern for satisfying customers and improving the organizational performance. It involves the proper coordination of work processes which allows for continuous improvement in all business units with the aim of meeting or surpassing customer's expectations. It emphasizes on quality in all facets of an organization with the aim of reducing waste and rework reduce cost and increase efficiency in production, continuous improvement is a firm-wide management philosophy of continuously improving the quality of the products /services /processes by focusing on the customers' needs and expectations to enhance customer satisfaction and firm performance. There are mixed results about the relationship between continuous improvement and performance. Mohammed (2006), asserted that continuous improvement is an effective system for integrating the quality development, quality maintenance and quality improvement efforts of various aspects of a system so as to enable services at most economical level and derive full satisfaction. CI is aimed at the satisfaction of customers needs in an efficient, reliable and profitable way. It involves a radical direction through which an organisation perform her day to day operations in other to ensure that quality is put at the top of mind of every employee and departments in which they operate. The effective implementation of CI will increase customer satisfaction with the service offerings (Omachonu and Ross, 1994). Quality enhances customer loyalty through satisfaction; this in turn can generate repeat business and lead to the attraction of new customers through positive word of mouth. The word of mouth communication will help in cost reduction. This Omachonu and Ross (1994), noted will provide competitive edge to the company. The improvement in quality will result in increased market share, profitability and customer loyalty. Implementation of CI further ensures that organizations change how they perform activities so as to eliminate inefficiency, improve customer satisfaction and achieve the best practice (Porter, 1996). Porter noted that constant improvement in the effectiveness of operation is essential but not a sufficient factor for organization to be profitable. Sila (2007), CI helps in improving the quality of products and also reduces the scrap, rework and the need for buffer stock by establishing a stable production process. He argued that CI will reduce the cost of production and time of production. Continuous improvement is said to reduce the product cycle time thus improving productivity (Huang and Lin,

2002). Many other CI practices such as training, information system management, relationship with suppliers etc have a positive impact on operational performance. The efficient management handling of these practices will improve efficiency and no doubt affect the profitability of the firm and the product quality of the firms.

Before quality can be measured, quality must be cleared, but there are complications because there are no universal definition. Set Standard exists at the same time, there are alternative measures laid from five main approaches, which are transcendent, product-based, user-based, manufacturing-based, and value-based (Sebastianelli and Tamimi, 2002).

Supply Chain Practice and Firms Performance

SC practices as a set of activities carry out in any organization to promote effective management of its supply chains; From this we can see that components of SC practices includes supply and material management issues, operations, information technology and sharing (Information Communication Technologies) and customer service. Other components such as technology, cost, inventory management, competitiveness and external regulations, according to needs to be managed effectively to achieve to business goals of each supply chain members. It also leads to value creation to end customer. (Charles et.al, 2014).Delaney et al, (1996) point that organizational performance can be evaluated by quality service and products, satisfying customers, market performance, service innovations, and employee relationships. On the other hand, Hoque et al, (2000) in their study of organizational performance based on balanced scorecard, stated that organizational performance can be appraised by return of investment, margin on sales, capacity utilization, customer satisfaction and product quality. In the same way, Greene et al, (2007) identified that return on investment, sales and market growth, and profit are important factors that can be measured by organizational performance. In all these performance measures, SC practices have a positive relationship or generally affects the level of organizational performance

Just in Time Practice and Customer Satisfaction

Stevenson (1996) defines the term JIT manufacturing as 'a repetitive production system in which processing and movement of material and goods occurs just as they are needed, usually in small batches'. JIT implementing firms have to produce and deliver finished goods JIT to be sold, sub assemblies JIT to be assembled into finished goods, fabricated parts JIT to go into the subassemblies and purchased materials JIT to be transformed into fabricated parts (Schonberger, 1982a). JIT philosophy is based on the concept of delivering raw materials when needed; producing products when there is a need, improve quality of product. The fundamental objective of JIT is to eliminate all waste from the entire supply chain and to improve product continuously (Frazier et al., 1988)

Customer satisfaction as a major determinant of business performance is highly relevant to the long term success of an efficient inventory management system. Customer satisfaction is therefore, very significant to marketing concept with strong reasons of strategic linkages between overall quality and customer satisfaction (**Truch, 2006).** The customer perspective involves looking beyond the traditional logistics function and fitting the Just-In-Time distribution into a broader system which starts with a customer service. Integrated problem-solving initiatives of a JIT distribution concentrate on improving customer service and facilitating timing in product distribution to customers result in greater customer satisfaction .Claycomb, Dröge and Germain (1999) define JIT with customers as a use of integrated problem-solving initiatives of a JIT philosophy concentrating on improving quality and facilitating timing in supply and distribution to external customers. Juran and Dershin (1999) use the term timing as a customer metrics in terms of supply chain delivering orders at the time needed for customers

Performance measurement

Performance measurement is a quantifying process for the efficiency and effectiveness of an action. The main performance metrics in relation to a manufacturing company performance is based on: quality, speed, dependability and cost (Vore, 2002). Performance of Lean can be measured through various indicators which are: quality, productivity, costs, capacity and inventory. In the case of lean manufacturing the specific performance indicators include: factory time, efficiency, flow time, through put and work in process inventory (WIP).Throughput simply means the amount of material that enters and goes through a machine or system. In the case of manufacturing it is basically the conversation rate of raw material to finished product per certain period of time. Business dictionary defines through put as General Productivity of a machine, procedure, process, or system over a unit period, expressed in a figure-of-merit or a term meaningful in the given context, such as output per hour, cash turnover, and number of orders shipped (Smith and Hawkins, 2004).

Theoretical Review

Lean Manufacturing theory

Lean manufacturing theory states that the maximization of process velocity through the reduction of waste is fundamental. It provides tools for analysing process flow and delay times at each activity in a process. The focal point is the separation of "value-added" from "non-value-added" work. The Lean Manufacturing method originates from Taiichi Ohno's Toyota Production System (TPS) which is closely related to the Just-In-Time (JIT) principles (Shah and Ward, 2007). Lean is essentially aimed at the reduction of waste and inefficiencies within processes across the entire supply chain, and is focused on those activities that increase the quality and value of the product for the customer. The method stimulates continuous improvement cycles within all

layers of the firm and its entire supply chain to reach increased process performance rates (De Treville and Antonakis, 2006). In the Lean process of continuously identifying and eliminating waste (Chen, Li & Shady, 2010), redesign programs are initiated to maximize the customer perceived value of a product or service (Gautam and Singh, 2008).

Empirical Review

Mohammad, Suhaiza and Sunghyup, Kwangyong (2019) did a study on impact of Lean Manufacturing Practices on Firms' Sustainable Performance in Malaysia: Lean Culture as a Moderator. The aim of this study is to examine the effect of lean manufacturing practices on firms' environmental performance by considering lean culture as a moderator. Data were gathered through a survey of 187 manufacturing firms in Malaysia and were analyzed using the partial least squares technique. The results indicate that process and equipment, product design, supplier relationships, and customer relationships have a positive and significant effect on sustainable performance. It is also interesting to observe that lean culture positively moderated the effects of process and equipment and supplier relationships on sustainable performance. These results have important implications for enhancing the sustainable performance of manufacturing firms through lean manufacturing practices

Marcel and Ayankeng (2015) investigated the impact of Continuous improvement (CI) on organizational performance. Data are collected from manufacturing firms in the republic of Cameroon. Variables used to capture Continuous improvement (CI) are management commitment through leadership, Quality control, inspection, employee training, customer focus, benchmarking as the basis for enhancing product quality. Organizational performance was measured by Customer Satisfaction, Corporate Social responsibility, Cost Reduction, and Employee Satisfaction. We run a series of multiple regressions of organizational performance variables on explanatory variables defining CI. Results show that only employment training and empowerment has a significant impact on financial performance and corporate social responsibility; leadership commitment, quality control and inspection have a significant impact on cost reduction. However, none of the CI practices appear to have a significant effect on customer satisfaction

Muhammad , Flevy and Khalid (2017) did a study on the effect of CI on organizational performance: empirical evidence from the textile sector of a developing country using SEM . The effect of national culture on CI implementation is gaining importance; thus, several studies argue that the effect of CI practices on organizational performance needs to be evaluated in different social, cultural, and economic settings. Furthermore, this study also contributes in the important debate in the operations management literature related to convergence versus divergence argument in CI implementation. Therefore, this study provided empirical evidence from a developing

country in South Asia. Data were collected from the member companies of All Pakistan Textile Mills Association by using a questionnaire. The questionnaires were sent to 210 textile companies and the respondents were quality or production managers. Structural equation modelling was used to investigate the effect of continuous improvement on organizational performance. The findings of this study indicate that IC has a highly positive effect on organizational performance. These findings support the divergence argument, which indicates that the positive effect of IC on organizational performance is not limited only to companies located in developed nations, but can also be equally achieved in other parts of the world.

Milé (2013) conducted a study on the effects of continuous improvement and innovation management practice on Small Medium Enterprise (SME) Performance**.** The results of a mail survey used to investigate the relationship between continuous improvement/innovation management practices and SME performance in Australia. Multi-item scales were developed and used to measure key components of continuous improvement and innovation management. Nine dimensions of SME performance were measured, for example, speed to market, success rate of new products, improved product innovation and reduction in waste. Hypotheses, relating practice with performance outcomes, were developed and tested within a Continuous Improvement and Innovation Management (CIAIM) framework, using response data from 115 Australian SMEs from the manufacturing sector. A survey response rate of 21per cent was obtained. The following results were obtained using multivariate analysis techniques: The CIAIM model was found to be a valid and reliable framework for measuring and predicting the relationship between continuous improvement/innovation management practice and SME performance. The most significant predictors of high SME performance were found to be: was found to be a critical factor for high performing SMEs to achieve their strategic goals and objectives. The use of core technology and organizational objectives as a guide for evaluating new ideas and information as part of the continuous improvement and innovation management system. The study concluded that a continuous improvement and innovation management strategy and system are significant predictors of SME performance. The implication for managers is that these practices are imperative in order to avoid SME failure.

Abdul and Anny (2005) did a study on Just in time approach in inventory management in Malaysia. The main purpose of this research was to find out whether the implementation of JIT would reduce the inventories at Electronics component industry especially at the parts producing stamping of FCM. This research is done by case study. Therefore the data collection used secondary data which is the documentation from FCM itself and also via observation. The data were analyzed by doing the comparison before and after the implementation of JIT using Microsoft words excel. From the analysis that had been done, the implementation of JIT had increased the inventories management at the stamping parts production. As the

conclusion, the implementation of JIT in the inventory management at the parts production stamping at Electronics component industry had successfully reduce the inventories level while improving the inventory level.

Musara (2012) did a study on impact of just-in-time (JIT) inventory system on efficiency, quality and flexibility among manufacturing sector, small and medium enterprise (SMEs) in South Africa. The impact of application of Just-In-Time (JIT) inventory management system in the manufacturing sector SMEs in Africa. Copies of self-administered questionnaire were distributed to a sample of manufacturing sector SMEs in the food, wood and furniture, metals, non-metals and other industries. The study revealed that the majority of SMEs in the manufacturing sector were not applying the JIT inventory management principles. It was furthermore revealed that there are challenges impeding the implementation of JIT principles in the manufacturing sector SMEs. These challenges include lack of reliable supplier networks, lack of capital and lack of knowledge of immediate financial gains among others. Furthermore, statistically significant positive correlations between the application of JIT inventory management principles and cost efficiency, quality and flexibility were found. It is therefore deduced that manufacturing sector SME scan benefit significantly in terms of improved quality of products, increased operational cost cuts and increased flexibility by applying the JIT inventory management principles

Yazan (2017) carried out a study on the impact of just in time system on operational excellence in the (14) manufacturing companies operating at Al –Hussein bin Abdullah II qualified industrial zone (QIZ) in Al-Karak Governorate in Jordan. The sampling unit and analysis (respondents) included (168) manager and head of divisions at the production and logistic departments, and selected purposely according to their work especially in the just in time system area within the target companies. Thus, the researcher designed a questionnaire including of (25) items to gather the desired data from study sample. This study also used the multiple regression analysis to test the hypotheses. The result of the current study found that the just in time system have a positive impact on the operational excellence in Jordan industrial companies. According to these results the study recommended that the Jordanian industrial companies must emphasis essentially and mainly on their just in time system consisted of (equipment layout, supplier's quality, Setup time reduction; Pull production) in order to enhance and attain the operational excellence and gain competitive advantage. One of the most limitations is that the current study and its finding applied on the Jordanian industrial companies especially at Al-Karak governorate.

Faisal (2017) conducted a study on the impact of supply chain management practices on supply chain performance in the Jordanian Industrial Sector. Also, it aimed at assessing the level of awareness and understanding of supply chain management

concepts and practices in the Jordanian context. Design/ methodology/ approach- The research methodology involved the adoption of a survey as a research strategy and quantitative approach, utilized a self-administered questionnaire, to arrive at the major findings of the study. The type of research is a single cross-sectional design in which the collection of data from the respondents was carried out only once. Data were analyzed using the statistical package for social sciences (SPSS). Finding- The paper revealed that there is an impact of supply chain management practices on supply chain performance in the Jordanian Industrial Sector. It also revealed that there is a high level of awareness among the respondent about the supply chain management concept

Ayman, Bader and Noor (2012) carried study the impact of supply chain management practices on supply chain performance in terms of supply chain efficiency and supply chain effectiveness. Additionally, they investigated the moderating effect of competitive intensity on the relationship between supply chain management practices and supply chain performance. Data for this research were collected from 104 manufacturing companies in Jordan. Hierarchical regressions were used to test the hypothesized relationships. The results indicate that three supply chain management practices, internal integration, information sharing, and postponement, but not supplier integration and customer integration, significantly and positively affect supply chain efficiency performance. Competitive intensity moderates the relationship between each of internal integration, supplier integration, and customer integration, and supply chain efficiency performance. The results also show that three supply chain management practices, internal integration, customer integration, and postponement, but not supplier integration and information sharing, significantly and positively affect supply chain effectiveness performance. Competitive intensity moderates the relationship between each of customer integration and information sharing, and supply chain effectiveness performance.

Veera, Abdul and Chandran (2009) did a study on supply chain management practices in the electronics industry in Malaysia Consequences for supply chain performance Purpose– The purpose of this paper was to explore the effects of different dimensions of supply chain management practices (SCMP) on supply chain performance (SCP) in the electronics industry in Malaysia .Design/methodology/approach– The study employed the quantitative method where convenience sampling and self-administrated survey questionnaires were sent to 125 electronics firms in Malaysia. The research framework was tested using variance-based structural equation model, the partial least squares (PLS) method. Findings– The empirical results of PLS indicate that six of the seven dimensions of SCMP have a significant positive effect on SCP. Furthermore, agreed vision and goals shows a greater influence than other dimensions of SCMP.

Methodology

The study was carried out using descriptive survey design. The population of the study was 1528 drawn from employees of the selected breweries pants in southeast Nigeria. A sample size of 431 was determined from the population using Cochran sample size determination method. The instrument used for data collection was questionnaire structured in 5 point Likert scale and The instrument was validated with content validity of face to face approach by giving this instrument to management experts and industrist who made the necessary correction for the instrument to measure what it ought measure. The reliability test was done using test-retest method. The result gave a reliability coefficient of 0.72, indicating a high degree of consistency. Four hundred and thirty one copies of the questionnaire were distributed and four hundred and one copies were returned. The three hypotheses formulated were tested at 0.05 level of significance. Pearson's Product Moment Correlation coefficient was used to test hypotheses 2 and Simple linear regression was used to test 1 and 3 . A computer aided Microsoft special package for social science (SPSS) was used to aid analysis.

Data Analysis and Discussion

The data obtained from the field were presented and analyzed with descriptive statistics to provide answers for the research questions while the corresponding hypotheses were tested with Pearson's product moment correlation efficient and simple linear regression at 0.05 alpha level

Table 1 Continuous improvement and product quality of the Brewing plants in South East, Nigeria?

s/no	Questionnaire items	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Mean	Remarks
	Continuous Improvement							
1	In my organization maintaining quality is put at the top of the mind of every employee in their day to day activities	230 (57.36 %)	152 (37.91 %)	7 (1.75 %)	10 (2.49 %)	2 (0.49 %)	4.67	Agreed
2	Our customers' needs must be satisfying at the most efficient way	202 (50.37 %)	180 (44.89 %)	11 (2.74 %)	5 (1.25 %)	3 (0.75 %)	4.40	Agreed
3	We have a company culture that aims at	160	230	3	5	3	4.09	Agreed

	zero detects in all our operation	(39.90 %)	(57.36 %)	(0.75 %)	(1.25 %)	(0.75 %)		
4	Product Quality Our products meet the needs of our customers	260 (64.84 %)	130 (32.42 %)	6 (1.50 %)	4 (1.00 %)	1 (0.25 %)	4.11	Agreed
101015	Our product confirmed with the standard of the regulating authorities in our industry	212 (52.87 %)	180 (44.89 %)	3 (0.75 %)	4 (1.00 %)	2 (0.50 %)	4.49	Agreed
161	We ensure that our products stand for the test of time in the competitive market	140 (34.91 %)	246 (61.35 %)	6 (1.50 %)	6 (1.50 %)	3 (0.75 %)	4.52	Agreed

Source: Fieldwork 2024

Hypothesis One

Ho: Continuous improvement does not have significant effect on Product Quality of the Brewing Plants of South-East, Nigeria

Table 1a Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.555[a]	.308	.306	.38716	.077

a. Predictors: (Constant), Continuous improvement
b. Dependent Variable: Product quality

Table 1b ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.581	1	26.581	177.326	.000[b]
	Residual	59.809	399	.150		
	Total	86.389	400			

a. Dependent Variable: Product quality
b. Predictors: (Constant), Continuous improvement

Table 1c Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	1.375	.043		31.632	.000
	Continuous improvement	.391	.029	.555	13.316	.000

a. Dependent Variable: Product quality

R = .555

R^2 = .308

F = 177.326

T = 13.316

DW = .077

Interpretation:

The regression sum of squares (26.581) is less than the residual sum of squares (59.809), which indicates that more of the variation in the dependent variable is explained by not the model. The significance value of the F statistics (0.000) is less than 0.05 which means that the variation explained by the model is not due to chance. The significance of the F value indicates that, overall, the model statistically significantly predicts the outcome variable. In other words, it is a good fit for the data.

R, the correlation coefficient which has a value of 0.555, indicates that there is a positive relationship between continuous improvement and product quality. R square, the coefficient of determination, shows that 30.8% of the variation in product quality is explained by the model.

With the linear regression model, the error of estimate is low, with a value of. .38716. The Durbin Watson statistics of 0.077, which is not more than 2, indicates there is no auto correlation.

The continuous improvement coefficient of 0.555 indicates a positive significance between continuous improvement and product quality which is statistically significant (t = 13.316). Therefore, the null hypothesis should be rejected and the alternative hypothesis accordingly accepted. Thus, Continuous improvement have significant effect on Product Quality of the Brewing Plants of South-East, Nigeria

Table 2 The correlation between supply chain and production cost of the Brewing plant in the South East, Nigeria.

s/ no	Questionnaire items	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Mean	Remarks
	Supply Chain							

7	we meet the demand for our product by customer because we pay attention to suppliers of our raw materials	350 (87.28 %)	35 (8.73%)	8 (2.00%)	6 (1.50 %)	2 (0.49%)	4.5 6	Agreed
8	We involve our supplier in decision making in this organization	150 (37.41 %)	230 (57.36 %)	7 (1.75%)	10 (2.49 %)	4 (`9.99%)	4.4 1	Accept
9	We encourage customers to share information with us that will help us to serve them better	120 (29.93 %)	270 (67.33 %)	3 (0.75%)	5 (1.25 %)	3 (0.75%)	4.3 4	Accept
10	Production Cost We ensure we get our raw materials from the cheapest source	200 (49.88 %)	181 (45.14 %)	5 (1.25%)	11 (2.74 %)	4 (1.00%)	4.5 1	Agreed
11	We buy bulk purchase so as to get at cheaper rate	215 (53.52 %)	160 (39.90 %)	11 (2.74%)	10 (2.50 %)	5 (1.25%)	4.4 5	Agreed
12	We pay our workers who are directly involved in the producing final product	105 (26.19 %)	275 (68.58 %)	7 (1.74%)	12 (2.99 %)	2 (0.50%)	4.3 9	Agreed

Source: Fieldwork, 2024

Hypothesis Two

There is no significant positive correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria

Table 2a Descriptive Statistics

	Mean	Std. Deviation	N
Supply chain	1.4414	.66120	401
Production cost	1.4863	.71094	401

Table 2b Correlations

		Supply chain	Production cost
Supply chain	Pearson Correlation	1	.957**
	Sig. (2-tailed)		.000
	N	401	401
Production cost	Pearson Correlation	.957**	1
	Sig. (2-tailed)	.000	
	N	401	401

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

The descriptive statistics of supply chain and product cost is shown in Table 2a. The table shows a mean response of 1.4414 and standard deviation of .66120 for supply chain and a mean response of 1.4863 and standard deviation of .71094 for production cost and number of respondents 401. A close examination of the standard deviation values reveals a non -significant difference in the standard deviation scores of the two variables. This implies that the variability of data points between the dependent and independent variables is about the same.

Table 2b displays the Pearson correlation coefficient for supply chain and production cost. The correlation coefficient shows a value of 0.957. This value indicates that correlation is significant at 0.05 level (2tailed) and implies that there is a significant positive relationship between supply chain and production cost (r = .957). The computed correlation coefficient is greater than the table value of r = 0.957 with 399 degrees of freedom (df. = n-2) at alpha level for a two-tailed test (r = .957, p< .05). As a result, since the computed r = .957, is greater than the table value of 0.098. We reject the null hypothesis and conclude that there is a positive relationship supply chain and production cost (r =. 957, P<.05).

Table 3 Just in time delivery practice and customer satisfaction of Brewing plants in South East, Nigeria

s/n	Questionnaire items	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Mean	Remarks

13	Just -in –time delivery practice Our suppliers deliver on time as agreed during the bucking	154 (38.40 %)	233 (58.10 %)	5 (1.25%)	4 (1.00%)	5 (1.25%)	4.56	Agreed
14	Our suppliers deliver goods to us just when we want it	272 (67.83 %)	100 (24.94 %)	5 (1.25%)	15 (3.74%)	9 (2.24%)	4.40	Agreed
15	The policy of getting our supplies just when we need them means we do not have to store the goods	130 (32.42 %)	250 (62.34 %)	8 (2.00%)	10 (2.50%)	3 (0.75%)	4.28	Agreed
16	Customer Satisfaction our organisation try to meet and even exceed customer expectation	279 (69.58 %)	102 (25.44 %)	5 (1.25%)	8 (1.99%)	7 (1.75%)	4.46	Agreed
17	Our sales index has been constantly on the increase from year to year	200 (4.99%)	180 (44.89 %)	5 (1.25%)	11 (2.74%)	5 (1.25%)	4.64	Agreed
18	Based on our customer feedback we find out those who are in love with our product	100 (24.94 %)	287 (71.57 %)	7 (1.75%)	5 (1.25%)	2 (0.49%)	4.37	Agreed

Source: Fieldwork, 2024

Hypothesis Three

Ho: A just-In-Time delivery practice does not have significance on Customer Satisfaction of the Brewing Plants in South-East, Nigeria

Table 3a Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.869[a]	.755	.754	.44153	.117

a. Predictors: (Constant), Just in time delivery practice
b. Dependent Variable: Customer satisfaction

Table 3b ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	239.302	1	239.302	1227.494	.000[b]
	Residual	77.786	399	.195		
	Total	317.087	400			

a. Dependent Variable: Customer satisfaction
b. Predictors: (Constant), Just in time delivery practice

Table 3c Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.011	.051		-.210	.833
	Just in time delivery practice	1.133	.032	.869	35.036	.000

a. Dependent Variable: Customer satisfaction

R = .869

R^2 = .775

F = 1227.494

T = 35.036

DW = .117

Interpretation:

The regression sum of squares (239) is greater than the residual sum of squares (77.786), which indicates that more of the variation in the dependent variable is explained by the model. The significance value of the F statistics (0.000) is less than 0.05 which means that the variation explained by the model is not due to chance. The

significance of the F value indicates that, overall, the model statistically significantly predicts the outcome variable. In other words, it is a good fit for the data.

R, the correlation coefficient which has a value of 0.869, indicates that there is a positive relationship between Just-In-Time delivery practice and customer satisfaction. R square, the coefficient of determination, shows that 77.5% of the variation in customer satisfaction is explained by the model.

With the linear regression model, the error of estimate is low, with a value of .51178. The Durbin Watson statistics of 0.129, which is not more than 2, indicates there is no auto correlation.

The Just-In-Time delivery practice coefficient of 0.869 indicates a positive significance between Just-In-Time delivery practice and customer satisfaction which is statistically significant (t = 35.036). Therefore, the null hypothesis should be rejected and the alternative hypothesis accordingly accepted. Thus, Just-In-Time delivery practice have significant effect on customer satisfaction of the Brewing Plants in South-East, Nigeria

Summary of Findings

Based on the analyzed data, the study found that**:**

i. Continuous improvement had significant effect on Product Quality of the Brewing Plants of South-East, Nigeria (r = 0 .555; F = 177.326; t = 13.316 ; P < 0.05) .

ii. There was a significant positive correlation between Supply Chain and Production Cost of the Brewing plants in the South-East, Nigeria (r = 0. 957, P<.05). .

iii. A just-In-Time delivery practice had significant effect on Customer Satisfaction of the Brewing Plants in South-East, Nigeria (.r = 0 .869; F= 1227.494; t = 35.036; P <0.05)

Conclusion

We can conclude that Continuous improvement to a large extent affect product quality in the Brewing plants of South East, Nigeria, indicating that Continuous improvement ensure that set standard is put at the top of the mind of every employee and departments by producing quality product that will meet or exceed customers expectation in their daily activity and also their long term plan. And there is a significant positive relationship between supply chain and production cost of the Brewing plants in the South East, Nigeria suggesting that supply chain has undergone a revamp, and latest technologies and advancements, high-speed communication and automated systems have paved the way for better and improved services. The best part of this process is that it can increase financial standing, minimize operating costs

and boost customer services in a company. Also a just –in- time delivery, significantly promote customer satisfaction in the Brewing plant in South East, Nigeria, this implies that a just –in- time delivery constantly on-time fulfillment gradually builds up customers' reliability, thus, through service – branding works well than other public relation opportunities. Their satisfaction tends to drive them to share their positive ratings and reviews on the products through different channels, to bounce back to increase their credibility. On the long run the companies win loyalty and support from their customers as true friends. There is a strong relationship between total productive maintenance and employee commitment in the Brewing plants in South East, Nigeria suggesting that total productive maintenance can improve the technological base of a company by enhancing equipment technology and improving the skills of employees. In all, there is strong positive effect of Lean management practices on performance of Brewing plants in South East Nigeria

Recommendations

Based on the findings of the study, the following recommendations are proffered**:**

i. Brewing plants in South East, Nigeria should embrace Continuous improvement which will help to maintain the realms of quality on a consistent and continuous basis, also enable firms to conduct market research and study on a regular basis having a drive in offering the products that stand as a testimony to the quality and its principles.

ii. Brewing plants in South East Nigeria should ensure that their supply chain **concentrates on the most important member, the customer who should be kept satisfied** at all costs, thus helping to boost customer services and also put in place a well-managed supply chain that removes disruptions and obstacles in their business activities.

iii. Just –in- time delivery is an inventory management strategy that helps facilitate speedier order fulfillment with particular applications in raw materials orders and manufacturing, therefore Brewing plants in South East Nigeria should faster turnaround of stock to prevent goods becoming damaged or obsolete while sitting in storage, thus reducing waste. This again saves money by preventing investment in unnecessary stock, and reducing the need to replace old stock.

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