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THE IMPACT OF PRODUCTION PLANNING AND CONTROL ON THE OPERATIONAL COST OF MANUFACTURING INDUSTRY IN NIGERIA (A STUDY OF NESTLE NIGERIA PLC., AGBARA, OGUN STATE)

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Abstract

This research work was carried out to determine the impact of production planning and control on the operational cost of manufacturing industry in Nigeria taking Ogun state as a proxy. Nestle Nigeria PLC, Agbara was used as case study. A simple random techniques was adopted to obtain data from 80 respondent as sample size whereby 80 were returned with a population of 400. Three hypothesis were tested to identify the significant effect of production planning and control on operational cost, organizational effectiveness and profitability of manufacturing firms. Data for this study was analyzed using statistical package for social sciences (SPSS) and simple linear regression method of inferential statistics using the T-Statistics of correlation co-efficient and linear regression coupled with the generated P Value. The finding reveals that there is a positive and significant relationship between production planning and control and profitability of manufacturing firms. It was concluded that the effectiveness of the production process depends on the operational planning level of development. The study recommends that Nigeria manufacturing firms must be seriously involved in effective and formal planning of production activity and implementation.

Keyword: production planning, control, operational cost, profitability and organization effectiveness.

Introduction

The business terrain in which firms operate has witnessed tremendous change in the past in terms of material sourcing, customer satisfaction, inventory management and overall profitability. The level of globalization, which entails that many organizations find themselves operating in a highly competitive international market and the use of highly advanced strategy and technologies have challenged the very basic principles and ideologies of business management and marketing Management. To compete in a global environment, therefore, organizations have had to change in order to sustain growth and break new frontiers. As a result, most industries have transformed completely from manual processes to complicated, automated and computerized technologies and strategies (Minoli, 2005). Production planning is associated with planning (that is the acquisition, time of usage, quantity) of the resources required to perform these transformation steps, in order to satisfy the customers in the most efficient or economical way (Ahuja, 2004). In other words, the production decisions are typically taken by looking at the best trade-off between financial objectives and customer service or satisfaction objectives. Profitability is a state or condition of yielding financial profit or gain, in other words, profitability refers to the operating efficiency of the enterprise. It is the ability of enterprise to get sufficient return on the capital and employees used in the business operation. Revenue and profits are driven solely by market share and efficiency, therefore success is determined mainly by the ability of a company to ensure superior capacity utilization.

This research intends to examine the impact of production planning and control on the operational cost of manufacturing industry in Nigeria with specific focus on Nestle Nigeria PLC. It encounters problems such as the disconnection between material demand planning and capacity demand planning, the lack of overall optimization mechanism, incorrectly defined planning environment, and a mismatch between the production planning and control methods and the planning environment, no coordination or incorrect coordination of the information flow, both between the client and the enterprise, and between the production process and the production planning and control process, High fluctuation in the resources use in the production process. (The headcount, job types and quantities of the materials).

The general objective of this study is to examine the impact of production planning and control on operational cost of Nestle Nigeria PLC while the following are the specific objectives

- To examine the effect of production planning and control on operational cost of Nestle Nigeria PLC.
- To examine the effect of production planning and control on profitability of Nestle Nigeria PLC.
- To examine the effect of production planning and control on organization effectiveness and productivity of Nestle Nigeria PLC.

Literature review

Production Planning and Control

Production planning involves the sequence of activities performed before the real production process. These include schedule of production, economic batch quantities, dispatch of priorities and operation sequence. In order hand, production control ensures the implementation of all plans for production such as initiation of production, dispatching of items, monitoring of production activities among others. However, production itself is the organized activity that leads to the transformation of raw materials into useful products. For a successful production, series of activity are involved. These include effective utilization of resources such as workers, finance, equipment, materials and time. Production planning and control is a tool available to the management to achieve the stated objectives. Production planning and control is the direction and coordination of firm's resources towards attaining the prefixed goals. It helps to achieved uninterrupted flow of materials at the right time and required quality. Production planning and control deals with implementation of set out plans, involving the detailed scheduling of jobs, assigning of workloads to machines and people as well as the actual flow of work. While production planning and control is very necessary in the manufacturing sectors, it also has some challenges that limit its optimum performance. Such militating factors include lack of modern automation equipment for accurate computation, seasonal variations, market, after sales service, losses due to unpredictable factors, wastage and production of order. All these can be effectively addressed with continuous review of already set out production planning and control. Also, flexibility will equally help in dealing with some of these unexpected factors, by allowing management to take action. When planning and

control are not effectively adopted and implemented, operational cost will increase, which could lead to possibly collapse of an organization.

Cost

Resources must be sacrificed for any organization to achieve its objectives. To an accountant, cost is defined as a resource forgone to achieve a specific goal. This can be expressed as the monetary amount which must be paid to acquire goods and services. ACCA Study Text (N.D.) defines cost as the amount of expenditure incurred on, or attribute to a specific thing or activity cost of anything ordinarily is money spent to acquire that things. There are various kinds of costs:

Fixed cost

This is a kind of cost which does not change with activity level. They are constant within certain range of activities. It is when the maximum limit of a particular activity range is exceeded that fixed costs jump up. It can also be defined as costs that do not respond to a change in the level of activity such as an increase in output. Thus they represent one extreme of cost behavior in that within a certain period they remain the same.

Variable Costs

They are costs that vary with the level of activity. The higher the activity level the higher the amount of the cost incurred. Activity level is measured in terms of number of units produced. Variable cost is the cost which tends to vary with the volume of output, the variable cost per unit is the same amount for each for each unit produce, which means that the amount of resources used and the price of these resources are constant for each additional unit product (Asaolu & Nassar, 2011).

Direct Cost

This is where an item of cost can be traced to a product or service unit, that cost is direct to that product or service unit. Such a cost should be allocated to that product or service unit. Betts (2014) defines direct cost as the cost that is traceable and attributed to a product. Dury (2015) defined direct costs as one that is directly related or traceable to a cost objective where cost objective is any grouping to which cost is assigned such as unit of inventory.

Indirect Cost

This is the opposite of direct cost. This is a cost that cannot be traced to a product or services unit.

Cost Control

Cost control is concerned with an element of marginal cost which involves the determination of unit cost, measurement and correction of the performance of subordinates to make sure that the objective of the enterprises and the means to obtain them are accomplished effectively and economically (Lockey, 2012). Cost control is the regulation of cost of operating a business and is concerned with keeping costs within acceptable limits.

Theoretical and Empirical Framework

A significant number of papers have taken into consideration the impact of production planning on effectiveness of an enterprise. Some of the research has examined the impact

of elements of the planning scheme (aggregate planning, business scheme, aggregate production scheme, demand management, resources and capacity planning) and production control (forecasting control, procurement and control of materials and monitoring of production activities) onto the effectiveness of the production process (timely delivery, fallout ratio, equipment utilisation and productivity) (Wacker & Sheu, 2011). Effectiveness of manufacturing planning and control systems of manufacturing competitiveness: Evidence from global manufacturing data. Everette (2012) reported that forecasting future demand of a firm's product helps to eliminate any form of disruption to meet expected demand, which consequently enhances profitability and shareholders worth of the business. Higgins (2012) observed that firms with effective production planning system outperform those with an ad-hoc approach to production operations in around performance measures. Weimer (2012) revealed that productivity is significantly low when there is lack of production planning operations which may result from wastages, error in product design and rework. As regards the interrelations between operational production planning and type of production process (Yang & Chen, 2011). Are small firms less efficient in the implementation of operational production planning procedure in some enterprises is achieved in easier and in others in a more difficult way. In the majority of enterprises with assembly line production type, the same product constantly passes through same working posts with capacities harmonized reciprocally. In an enterprise with the assembly line production process type, it is enough to determine the rhythm of material inflow into the first processing phase, and the rhythm of outflow of final product from the final phase. Olusegun and Adegboyi (2010) in their study revealed that a significant relationship exist between production planning operations and organizational output, though not in the Nigerian manufacturing sector.

Methodology

The study used a descriptive research design. The target population of this research case study is Nestle Nigeria plc. The focus is on the management, the internal control and audit unit of the Nestle Nigeria plc. The population size used is 400 staff. A sample size of 80 participants were selected using Taro Yamane formula with a 10% error margin. A structured questionnaire was adopted as the research instrument for data collection. The Cronbach's alpha reliability test was used to measure the different strategies and the measures of performance under study to determine the average inter-correlation for all paired associations. With regards to content validity, the researcher sought expert judgment which was scrutinized by the supervisors. This was done by holding discussions, as well as making relevant comments and suggestions which were then synchronized. The obtained data was analyzed using descriptive and inferential statistics while the hypotheses were tested using regression analysis.

Model specification

The model specification is written as:

$$OC=f(PPC).....(1)$$

The OLS model of this functional relationship is given as:

$$OC = \alpha + \beta_1(PPC) + \varepsilon_i.....(2)$$

Where:

OC = Operational Cost

PPC = Production Planning and Control

α = Autonomous mean response of respondents opinion to Operational Costs when Production Planning and Control is held constant.

β_1 is coefficient of Production Planning and Control.

ε_i = Random Error term which is assumed to be NIID $\sim (0, \sigma^2)$

Results and Discussion**Table 1: Frequency and Percentage Analysis of Respondents Socio-Demographic Information**

S/N	ITEMS	VARIABLES	FREQUENCY	PERCENTAGE
1	Gender	Male	46	57.6
		Female	34	42.5
		Total	80	100.0
2	Age	18-24 Years	16	20.0
		25-34 Years	35	43.8
		35-44 Years	21	26.3
		45 years above	8	10.0
		Total	80	100.0
3	Marital status	Married	47	58.8
		Single	31	38.8
		Divorced	2	2.5
		Total	80	100.0
4	Educational Qualification	WAEC/GCE	5	6.3
		OND/NCE	23	28.8
		HND/BSC/BA	43	53.8
		MSC/PhD	9	11.3
		Total	80	100.0
5	Years of experience	1-5 years	22	27.5
		6-10 years	35	43.8
		Above 10 years	23	28.8
		Total	80	100.0

Source: Field Survey 2019

Table 2: Model Summary

R01	R Square	Adjusted R Square	Std. Error of the Estimate
.249 ^a	.062	.050	.465

Source: Extracted from SPSS, Version 20.

The R of 0.249 in table 2 depicts a strong positive degree of production planning and control and operational cost of manufacturing firm. This showed that increase in

production planning will result to decrease in operational cost. The R-Square of 0.062 shows that 6.2% variation in production planning can be accounted for by operational cost. The adjusted R-square of 0.050 indicates that the coefficient of determination will be 5% when other measured variables of operational costs are added to the model.

Table 3: ANOVA(Test of Model Significance)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.117	1	1.117	5.176	.026 ^b
	Residual	16.833	78	.216		
	Total	17.950	79			

Source: Extracted from SPSS, Version 20.

The overall test of model significance of table 3 reports the F-statistic of 5.176 with d.f (1, 78) and associated sig. value of 0.026 < α=0.05 level of significance implies that the model is adjudged to be a good fit and can be adopted in measuring the impact of production planning and control on operational cost.

Table 4: Regression Model Coefficients and Test of Significance (Dependent = Organizational Effectiveness)

Model	Coefficients		t-statistic	Sig.
	B	Std. Error		
(Constant)	3.183	.265	11.996	.000
Production Planning & Control	.167	.074	2.275	.026

Predictors: (Constant), Production Planning & Control

Source: Extracted from SPSS, Version 20.

$$OC = 3.183 + 0.167(PPC) \quad (3)$$

The intercept of 3.183 in equation (3) shows the autonomous Operational Cost when the predictor variable PPC is held constant and was found to be significant (P-value 0.000 < α=0.05 significance level). This value implies that Operational Cost of Manufacturing firm would be positively inclined with the influence of the considered predictor of Production Planning and Control. However, a unit increase in PPC tends to 16.7% incremental rate in Operational Cost of manufacturing firm. This indicates that as the rate of PPC, OC also decreases.

Hypotheses Testing

Decision rule:

Reject H_0 if α=0.05 level of significance is greater than the probability value (P-value) generated for the T-statistic value. Otherwise, fail to reject H_0 . For the purpose of this research work, the hypotheses was tested at 95% confidence level i.e. α=0.05.

Hypothesis One

H₀₁: Production Planning and Control have no significant impact on Operation Cost in Nestle Nigeria PLC.

H₁₃: Production Planning and Control have a significant impact on Operation Cost in Nestle Nigeria PLC.

Parameter estimate PPC in table 4 with t-statistic of 2.275 with an associated P-value of $0.026 < \alpha = 0.05$ indicates the rejection of H_{01} and we thereby conclude that production planning and control has a significant impact on operational cost in manufacturing firm. It can also be evidenced that the impact was found to be positively inclined as Production Planning & Control directly influence Operational Cost of manufacturing firm.

Hypothesis Two

H₀₂: There is no significant relationship between production planning and organizational effectiveness in manufacturing firm.

H₁₂: There is significant relationship between production planning and organizational effectiveness in manufacturing firm.

Table5: Correlation of Operational Production Planning and Organizational Effectiveness

			Operational Production Planning	Organizational Effectiveness
Operational Planning	Production	Pearson Correlation	1	.854
		Sig. (2-tailed)		.000
		N	80	80
Organizational Effectiveness		Pearson Correlation	.854	1
		Sig. (2-tailed)	.000	
		N	80	80

Source: Extracted from SPSS, Version 20

On whether organizational production planning have significant relationship with organizational effectiveness, the P-value $0.000 < \alpha = 0.05$ of Pearson correlation coefficient 0.854 in table 5 suggests the rejection of H_{02} and conclude that significant relationship exists between production planning and organizational effectiveness in manufacturing firm.

Hypothesis Three

H₀₃: There is no significant relationship between production planning and control and profitability of manufacturing firms.

H₁₃: There is significant relationship between production planning and control and profitability of manufacturing firms.

Table 6:Correlation of Production Planning and Control and Profitability of Manufacturing Firm

	Operational Production Planning	Profitability
Pearson Correlation	1	.514

Operational Planning	Production	Sig. (2-tailed)		.002
		N	80	80
		Pearson Correlation	.514	1
Profitability		Sig. (2-tailed)	.002	
		N	80	80

Source: Extracted from SPSS, Version 20.

On whether operational production planning have significant relationship with profitability of manufacturing firm, the P-value $0.002 < \alpha = 0.05$ in the Pearson correlation coefficient of table 6 indicates that we reject the null hypothesis of no significance and conclude that there is significant relationship between production planning and control and Profitability of manufacturing firm.

Interpretation of Results

This research study was primarily based on "Impact of Production Planning and Control on Operational Cost of manufacturing firm taking Nestle Nigeria Plc as case study". Empirical analysis of the research study indicates that operational production planning determines performance time in an organization as opined by respondents. Also, it was evidenced that without availability of capital, production planning and control cannot be influenced. The influence will thereby minimize cost and improve growth. In addition, analysis also showed that effectiveness of production planning and control depends on the information coming from the production process which is related among others with operations time and manufacturing sequences. However, statistical analysis made also indicates that production planning and control and operational cost of manufacturing firms are intertwined and have positive effects on each other. Based on the set objectives of this research study, hypothesis tested indicates that, it is of no doubt that there exist significant relationship between production planning and control and profitability of manufacturing firm as the degree of relationships were found to be positively inclined.

Conclusion

Producers compete via factors connected with quality, time, and costs. From the perspective of meeting the customer's needs quality of the product is the important aspect; following suit in importance are: the terms of product delivery, and the possibility to alter them flexibly. The market value of the product is substantially determined by the process of production planning and control. It coordinates the flow of information and materials between the external client and the market on the one hand, and the internal client, i.e. the production process, on the other hand.

The successful realization of the production process, besides depending on the quality implementation of operational planning, and, on quality of decision making. Managers' decisions are brought, in majority of cases, pursuant to the well elaborated production plan (basic or annual, dynamic annual, flexi quarterly, monthly or operational, term or weekly), and are aimed at realizing the production goals – timely production of quality products in the desired quantities with minimum costs. Since the obtained results clearly shows that more efficient operational planning and better elaboration of the preparatory tasks lead to higher effectiveness of the production process, the conclusion has been drawn that both features could serve as the platform for improvement of business activities in production enterprises in any industry with the objective to improve its competitiveness.

Recommendations

Based on these findings, the following recommendations were suggested;

- Since production planning enhances operational productivity performance, Nigerian manufacturing firms must be seriously involve in effective and formal planning of production activity and its implementation, irrespective of the size and age of the firm.
- Nigerian manufacturing firms should embrace the application of advanced manufacturing technology, such as automated production technology, computer assisted design and manufacturing (CAD/CAM), robotics and flexible, manufacturing systems.
- To ensure effective application of advanced manufacturing technology in the Nigerian manufacturing industry, professionals with high technical knowhow should be hired by the organization and effective training programmes should be organized for the organizational members who are to be affected by the technological advancement.
- There should be a formal relationship between the Nigerian manufacturing sector and the tertiary institutions. This will go a long way to aid the implementation of research findings.

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