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PRODUCTION PLANNING AND FIRM OPERATIONAL PERFORMANCE: A PERSPECTIVE FROM DANGOTE CEMENT PLC

Ehugbo Ikechukwu
Nnamdi Azikiwe University (PhD Student)
Corresponding Email: i.ehugbo@stu.unizik.edu.ng
Chinedum Temple Igwe
Cross River Institute of Technology and Management, Ugep, Nigeria
Email: igwetemple@gmail.com
Francis Ubi Ntum
Accountancy Department, Cross River Institute of Technology and Management, Ugep, Nigeria
Email: francisntum@yahoo.com

ABSTRACT

This paper focused on the effect of production planning on firm operational performance at Dangote Cement Plc. The study specifically investigates the impact of inventory control and forecasting on operational performance. The study was anchored on the theory of Resource-Based View (RBV). A descriptive survey research design was employed. The total population of the study comprises the staff of the selected departments in Dangote Cement Plc Benue Plant, which is one hundred and five (105) staff. This population was chosen because of their knowledge about the study. The sample size was determined at 83 using Taro Yamane's statistical formula. The reliability of the instrument was ascertained using Cronbach's coefficient statistics at 85%. The tested hypotheses revealed that inventory control and forecasting have a significant influence on the operational performance of Dangote Cement Plc Benue Plant. The study concluded that production planning determines the kind of activity to be carried out and the amount of time needed to perform this activity. This will improve and foster productivity through high organisational structure. The study therefore recommended that the management timely place an order for basic raw materials, as that will minimise the incidence of stock outs, which may affect the production process and customer satisfaction.

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1. INTRODUCTION

One of the most important roles in the process of operation and production management is production planning. In order to meet anticipated demand, executives of manufacturing sectors must decide on the precise aggregate amounts of production, stock, and personnel that must be created (Rad et al., 2014, cited in Ikon & Nwankwo, 2016). Therefore, businesses combine this planning system with regulatory tools. Applying the plans, thorough task scheduling, allocating workloads to machines (and people), and the actual flow of work through the system are the key concerns of production planning and control (Sharma et al., 2014). According to Albina (2017), it is a delicate procedure that necessitates the integration of numerous aspects, which is a difficult effort. A single erroneous step can cause the entire process to proceed incorrectly. The pace of industrial change and technological advancement in the modern business world makes every minute count when a company suffers a loss. The company needs a dynamic, adaptable system for production planning and control that allows for quick changes and lowers losses. Actions that need to be taken in the production and control processes must be carried out in a way that takes into account the customer's needs as well as the identification of the products with the highest seasonal customer demand and those that are consumed year-round. Production planning in manufacturing settings involves choosing the size of production lots for the various goods that will be produced. Therefore, this relates to processing the deadline for producing such lots as well as the equipment and/or production facility for the finished product. It appears that the poor performance of Dangote Cement can be attributed to the firm's inability to understand what customers want regarding product assortment, functionality, availability, durability, and features. When there is a discrepancy between what a company delivers and what people demand, that company will progressively lose its market share. Additionally, it appears that additional factors, such as dynamic changes in market conditions, high resource fluctuation, which results in process instability, and a high rate of change in customer demands, can have an impact on the accomplishment of the tasks and the goals of production planning and control (Jolanta, 2015).

Generally, an organisation's ability to manage production management issues, such as inventory control, production scheduling and control, equipment selection and control,

maintenance, plant size and location, structure and layout, quality and inspection, traffic and material handling, and finally methods, determines how competitive it is. The gap created by the possible effect of production planning on operational performance is what led to this study.

1.1 Objectives of the Study

The general objective of the study is to investigate the effect of production planning on operational performance in Dangote Cement Plc. Specifically the study seeks;

- To establish the influence of inventory control on operational performance
- To determine the impact of forecasting on operational performance

1.2 Research Questions

The following research questions were formulated to guide the study;

- To what extent does inventory control influence operational performance
- To what extent does forecasting influence operational performance

1.3 Research Hypotheses

The study hypotheses were formulated in null and alternate form:

H_0: There is no significant relationship between inventory control and operational performance in Dangote Cement Plc.

H_0: There is no significant relationship between forecasting and operational performance in Dangote Cement Plc.

2. LITERATURE REVIEW

2.1 Production Planning

Production planning represents the heartbeat of any manufacturing process. Its goal is to save production time and costs, manage resources effectively, and increase workplace effectiveness. Production planning is to create a physical structure and a set of operational procedures for the effective conversion of raw materials, labour, and other inputs into completed goods (Hemant, 2007). It comprises the purchase and allocation of constrained resources to manufacturing tasks in order to meet demand from customers over a predetermined period of time (Graves, 1999). Production planning takes into account a variety of production factors, from the routine actions of employees to the capacity to fulfil precise delivery timeframes for the customer. Designing the product, determining equipment and capacity needs, designing the layout of physical facilities and material handling systems, determining the sequence and nature of the operations to be performed along with time requirements, and specifying specific production quantities and quality levels are just a few of the activities involved in production planning (Hemant, 2007). Any kind of manufacturing process has the capacity to realise its full potential when an efficient production planning operation forms the basis of the process.

Production planning focuses primarily on two areas: (i) routing, or organising work tasks; and (ii) layout, or the spatial arrangement of resources. Production planning is dynamic in nature and constantly remains in a state of flux since plans may need to be modified in response to alterations in circumstances (Samuel, 1999). Production planning deals with choices regarding the purchase, use, and distribution of production resources in order to meet client requirements as effectively and efficiently as possible. Typical decisions include work force levels, production lot sizes, the assignment of overtime, and the sequencing of production runs (Graves, 1999). These choices are tactical in nature and collective. The quantity of intermediate and final goods to be produced throughout each period of the planning horizon is one of the decisions made during the production planning process. The total amount of resources needed to carry out the production plan for each to-be-established time period is likewise defined by production planning. The setup and product inventory costs incurred over the planning horizon are included in the production planning costs. Usually, planning is done with a rolling horizon. A plan is made for the planning horizon; however, it is only put into action for the first few time periods before being updated. In fact, as already said, the plan needs to be updated on a regular basis due to the ambiguity around demand predictions and output. For example, a company might make plans for the following 26 weeks but then change them once per month to account for fresh information on demand and production (Graves, 1999). Planning for production is frequently done on an overall scale, including both resources and products. To simplify planning, different but related items are merged into larger product families that may be planned as a unit. Similar to this, different machines or labour pools are combined to form an aggregate machine or labour resource. When specifying these aggregates, care must be taken to ensure that the resulting aggregate plan may be reasonably broken down into workable production schedules (Graves, 1999).

2.2 Inventory Control

The proper approach to inventory control can enable a dynamic optimisation of stocks to maximise customer service while reducing inventory and incurring lower costs. This is done by applying contemporary inventory control methods and new, more sophisticated methodologies. Two systems are often used to maintain inventory stocks (Francis & DE Souza, 2004). System that is periodic or circular; the stocks are examined at regular or set periods. As a result, while the ordered quantity is variable, the ordering interval is fixed. Depending on the available stock and the pace of consumption, orders are placed. Two-bin System: This perpetual inventory system uses two bins for each item in its supply. A larger bin with enough stock to last between the time an order arrives and the time the next order is placed, and another bin with enough stock to meet potential needs throughout the replenishment period. When the main storage container is empty, the order for the replacement is placed, and the stock in the secondary storage container is used until the requested material is received. For things with low usage values, this system may be effective. Considering the total competition in the market and the achievement of the greatest degree of customer service delivery, the limited resources must be used effectively. ICTs have been designed to have a positive effect on an organisation's bottom line. As a result, managers must employ scientific techniques to

maximise their returns from investments made at a low cost (Devnani, Gupta, & Nigah, 2010).

2.3 Forecasting

Forecasting is a technique or process for anticipating future business characteristics and is crucial for both immediate and long-term choices (Gahirwal & Vijayalakshmi, 2013). Making claims about activities whose true conclusions have often not been seen is what it entails. An everyday illustration could be the evaluation of a variable of interest at a given future time. Although related to prediction, the more generic phrase (Eelier et al., 2014) Any forecast should be accurate, timely, and cost-effective in order to be considered efficient. The forecast is accurate if it is well-calibrated, has out-of-sample validity, and predicts the future rather than describing the past. It is also accurate if it has a small error (Deepak, David, & Miroslav, 2015). According to Baffa and Rakesh Sarin (2002), forecasting is the process of making systematic predictions about the future, and the resultant number or statement is referred to as a forecast. In a world where the future is uncertain, virtually every commercial and economic choice is based on a forecast of future conditions. By using forecasts, management may make decisions about expenses, profits, sales, production, pricing, capital investments, and other factors with less uncertainty. Forecasting wouldn't be necessary if the future could be known for certain. However, there is uncertainty; future results are rarely guaranteed, hence a systematic technique of forecasting is required. According to Baffa and Rakesh Sarin (2002), forecasting serves the following primary purposes:

i. The development of action plans
ii. Monitoring the ongoing development of plans based on forecasts is the main use of forecasting.
iii. The forecast offers a warning system of the crucial variables that need to be evaluated frequently since they could have a significant impact on the success of the strategy.

According to Robert (2013), a corporation needs a demand forecasting system, which is normally run by the marketing division, for efficient production planning. This approach generates time-phased estimates of each finished good's unrestricted market potential (i.e., prospective sales at present prices, assuming product availability is imminent).

2.4 Theoretical Framework

2.4.1 Resource Based View Theory

The resource-based view (RBV) paradigm offers a plausible explanation for any connection between production planning and company success. Wernerfelt (1986) established this theory, which highlights the significance and impact of an organisation's resources on both its short- and long-term success. Corporate profitability is thus also largely dependent on the resources available to businesses. Furthermore, resources here could refer to either people or things. As a result, all assets, particularly inventory, cash, administrative assets, and human assets, are considered resources in this study (the forecasting and inventory control skills). Production planning, which is a function of organisational resources, is able to make use of other resources, such as cash, inventory, and overhead that are in the hands of commercial organisations in order to increase efficiency, effectiveness, competitiveness, and total profitability. Hence, the nexus and relevance of this theory are paramount to this study.

2.5 Empirical Review

The relevance of this study is based on the following empirical studies:

In an empirical study by Ikon and Nwankwo (2016) on Production planning and profitability of selected manufacturing firms in Nigeria, The study used Flour Mill of Nigeria Plc, Dangote Flour Mill Plc, and Honeywell Flour Mill Plc as case studies. According to the report, production planning is crucial for giving clients better, more affordable goods at a lower cost. The study identifies the issue as an inventory shortage brought on by stockouts and unexpectedly high demand; a supply challenge brought on by insufficient machine capacity and installation; inferior technology; poor capacity utilisation; an inability to meet budgetary targets due to changes in demand and supply variables; and poor demand forecasting. The data collected for the study were based on Secondary information. The data obtained were analysed using the Ordinary Least Squares (OLS) technique using time series. The findings of the study show that the estimated coefficient of the constant term is statistically significant at better than 0.1 percent for Dangote Flour Mill Plc and Honeywell Flour Mill Plc and statistically significant at 0.6 percent for Flour Mill of Nigeria Plc. This implies that an increase in turnover (sales) leads to a subsequent increase in inventory, which in turn increases the level of production. The increase in turnover subsequently increases profitability at Dangote Flour Mill Plc and Honeywell Flour Mill Plc.

In the study of Umoh, Harcourt, and Amah (2013), Production Planning and Corporate Productivity Performance in the Nigerian Manufacturing industry The study investigated the relationship between Production Planning and Corporate Productivity Performance in the Nigerian manufacturing industry. The study evaluated corporate productivity performance in terms of growth, improved equity capital, and cost reduction. Eighty respondents in the eighty sampled manufacturing firms out of the hundred in the industry that are publicly traded received the questionnaire, which was provided with three hypotheses. The questionnaire was retrieved in 62 copies. For the analysis, these and the companies' five-year financial statements were used. According to the study's conclusions, production planning significantly affects operational effectiveness, increased equity capital, and the expansion of the Nigerian manufacturing sector. The conclusion suggests that production planning has a considerable impact on organisations' corporate productivity performance. Based on the findings, the study suggested, among other things, that the Nigerian manufacturing sector evaluate the concepts and practises of production planning in order to reestablish the sector as the cornerstone of all progress.

3. RESEARCH METHODOLOGY

The study used a descriptive survey research design. The total population of the study comprises the staff of the selected departments in Dangote Cement Plc Benue Plant, which is one hundred and five (105) staff. This population was chosen because of their knowledge as it relates to production planning and

profitability trends in the organisation (Source: Human Resource Department).

3.1 Sampling Techniques and Sample Size

Taro Yamenes' formula was used to determine the sample size as follows:

$$n = \frac{N}{1-N(e)^2} \quad \text{---------- 1}$$

Where,
n = desired sample size
N is the size of the population.
e = limit of error tolerance, which was assured to be 5% (0.05); confidence limit.

$$n = 105$$
$$n = \frac{105}{1+105(0.05)^2}$$
$$n = \frac{105}{1+105(0.0025)}$$
$$n = \frac{105}{1+0.2625}$$
$$n = \frac{105}{1.2625}$$
$$n = 83$$

3.2 Validity and Reliability of the Instrument

Content validity was employed to ensure that the instrument measured what it intended to.

The reliability of the instrument was ascertained using Cronbach's coefficient statistics at 85%.

3.3 Method of Data Analysis

The chi-square statistical tool was employed to test the research hypotheses. Therefore, the formula below is hereby donated as follows:

$$X^2 = \frac{(Fo-Fe)}{Fe}$$

Where,
X^2 = Chi-square
Fo = Frequency Observed
Fe = Frequency Excepted

4. DATA ANALYSIS AND INTERPRETATION

Out of 83 questionnaires distributed, 78 (94%) were properly filled and returned, while 5 (6%) were wrongly filled and were not used for the present study.

Test of Hypotheses

H_0: Inventory control does not have a significant influence on operational performance at Dangote Cement Plc.

H_a: Inventory control has a significant influence on operational performance at Dangote Cement Plc.

Table 1. Test Statistic: Chi-square

Expected	Observed
66	12
66	12
59	19
∑ = 191	∑ = 43

Degree of freedom = (c-r)
where c = column; r = row
Df = 3-1 = 2
Using the formula

$$X^2 = \frac{\sum (E - O)^2}{Ei}$$
$$X^2 = \frac{\sum (191 - 43)^2}{191}$$
$$X^2 = \frac{(36481 - 1849)}{191}$$
$$X^2 = \frac{34632}{191}$$
$$X^2 = 181.31$$

Decision Rule: Reject the null hypothesis (H_o) if X^2 calculated is higher than X^2 tabulated and accept the null hypothesis (H_0) if X^2 calculated is lower than X^2 tabulated. Since the calculated Chi-square value is 181.31, the X2 is tabulated at a degree of freedom of 2, and a 95% confidence level is given as 5.99. Therefore, the null hypothesis is rejected and the alternate hypothesis is accepted; hence, it is concluded that inventory control has a significant influence on the operational performance of Dangote Cement Plc.

Hypothesis 2

H_0: Forecasting does not have a significant influence on operational performance at Dangote Cement Plc.

H_a: Forecasting has a significant influence on operational performance at Dangote Cement Plc.

Table 2. Test Statistic: Chi-square

Expected	Observed
55	23
60	18
60	18
∑ = 175	∑ = 59

Degree of freedom = (c-r)
where c = column; r = row
Df = 3-1 = 2.
Using the formula

$$X^2 = \frac{\sum (E - O)^2}{Ei}$$
$$X^2 = \frac{\sum (175 - 59)^2}{175}$$
$$X^2 = \frac{(30625 - 3481)}{175}$$
$$X^2 = \frac{27144}{175}$$
$$X^2 = 155.11$$

Decision Rule: Reject the null hypothesis (H_o) if X^2 calculated is higher than X^2 tabulated and accept the null hypothesis (H_0) if X^2 calculated is lower than X^2 tabulated. Since the calculated Chi-square value is 155.11 and the X2 is tabulated at a degree of freedom of 2, a 95% confidence level of 5.99 is given. Therefore, the null hypothesis is rejected and the alternate hypothesis is accepted; hence, it is concluded that forecasting has

a significant influence on the operational performance of Dangote Cement Plc.

5. DISCUSSION OF FINDINGS

The findings revealed that there is a significant relationship between inventory control and the operational performance of Dangote Cement Plc; this also implied that an increase in inventory control improves the level of operational performance of Dangote Cement Plc, and poor inventory control reduces it. This finding agrees with Ikon and Nwankwo (2016), who carried out a study on the profitability of a few Nigerian manufacturing companies' production planning. They argued that rising turnover (sales) should result in rising inventory, which should raise production levels.

The second finding of this study proved that forecasting has a positive and significant influence on the operational performance of Dangote Cement Plc. This therefore implies that good demand forecasting increases the level of operational performance of Dangote Cement Plc, and poor forecasting reduces it. Albina et al. (2017), who urged that forecasting customer demand based on a wide variety of business features is a serious input,

6. CONCLUSIONS

The process of effectively forecasting and utilising resources, including supplies and manufacturing capacities, to satisfy consumer demands is known as production planning. The effective planning of inventory control and forecasting will play an important role in maximising costs because of the significance of the various production-related costs. The investigated hypotheses showed that inventory control and forecasting significantly affect Dangote Cement Plc's operational performance. The study came to the conclusion that the type of activity to be performed and the time required to complete this activity are determined by production planning. The study was only conducted in the manufacturing sector, which must produce the most amounts possible with the fewest resources. Additionally, the planning that will result from this study will help the manufacturing sector increase productivity through accurate forecasts and inventory management.

7. RECOMMENDATIONS

Based on the study's findings and conclusion, the study recommends the following:

i. In order to reduce the likelihood of stock outs, this could have an impact on the manufacturing process and customer satisfaction. Management, should promptly place an order for basic raw materials.
ii. Forecasting should be used by management to choose the type and quantity of product to be produced. This eliminates overstocking of raw materials and uncontrolled cement production.

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