Production Planning and Operational Efficiency in the Food and Beverage Industry in Nigeria.

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Abstract *This study empirically tested the relationship between production planning in terms of manpower planning and material planning and operational efficiency of food and beverage industry in Rivers sate, Nigeria. It attempts to provide answer to the relationship between production planning and operational efficiency. Fifteen (15) firms were purposively selected from the food and beverage industry in Port Harcourt. Using the Spearman Rank Order Correlation Coefficient, we analyzed the data collected from the human resource manager, production manager and financial manager of the 15 selected food and beverage firms in Port Harcourt. We found that a positive significant relationship exists between production planning and operational efficiency and that organizational age moderate the relationship between the independent and dependent variables. Based on the findings, we recommended that all food and beverage firm should with seriousness embark on proper planning of production activities irrespective of the age of the organization among others.*

Key Words*: Production Planning, operational efficiency, organizational age, food and beverage firms.*

Introduction

The issue of efficiency, specifically in manufacturing sector is fundamental in this period of unprecedented uncertainty and complexity in the global economy. Efficiency boosts performance, eliminates waste and ensures full utilization of organizational resources. Operational efficiency increases profitability, productivity, competitiveness and market value. Sharma, Veshisth and Sharma (2014) defined operational efficiency as the proportion of actual output versus the extreme output. Operational efficiency depicts the extent an organization is competent to fully utilize its production resources in delivering products and services while still ensuring quality in a cost effective manner.

Over the years, studies have revealed the general poor level of efficiency in the manufacturing sector of the Nigeria economy of which the food and beverage industry is not left out. In Onuoha (2012) the following reveals the level of inefficiency in the manufacturing industry;

1. The manufacturing sector contributed 4.21% in 2009 to the Gross Domestic Product (GDP) of the Nigeria economy but its contribution falls to 4.1% in 2010.

1 The Average manufacturing capacity utilization reduced from 47% in 2009 to 45% in 2010.

2 Employment Figure in the first half of 2010 which was 9,666,395 show a decrease as compared to 998,086 in the corresponding period of 2009

3 Also, the production output reduces in an alarming rate from N183.8billion from January to June of 2009 to 165.7billion in the corresponding period of 2010.
4 The business unplanned inventory increased from N5.15 billion in first half of 2009 to N11.4 billion in the corresponding period of 2010.

The Nigerian Manufacturing Sector is obviously inefficient and thus, its contribution to the GDP of the country is unsatisfactory. Onuoha (2013), observed the impact of the manufacturing sector to the GDP of Nigeria was 4.21% in 2009, 4.19% in 2010, and 4.5% in 2011. Compare with some other countries like Egypt (15%), Singapore (24%), Malaysia (17%) and South Africa (16%) in the year 2011, and you will agree that this sector of the Nigerian economy is grossly inefficient. The Nigerian Bureau of Statistic report (first quarter, 2016) discloses that the sector GDP growth rate as at the first quarter of 2016 fall to -7.0% from 0.38% and -0.70% in fourth and first quarter of 2015. Sectorial Input to the GDP of 2016 First Quarter by Nigeria Bureau of Statistics and Central Bank of Nigerial (CBN), indicates that the food and beverage sector has -0.5% contribution to the GDP of the country. (*Trading Economics, 2016).* This observed inefficiency has elevated the mortality rate in the sector. We have seen manufacturing companies, which ought to be the life-blood to the country gradually experienced decline in all parameters of organizational success, and so many have closed shop. Operational efficiency entails full or near full capacity utilization and cost minimization. Capacity utilization is how an organization uses its installed productive capacity. Capacity utilization is weighted average of the ratios between the real production of an organization to the maximum which can be manufactured per given time with available plant and equipment (Johanson 1968). While cost minimization is a systematic way of delivering goods in the most cost effective manner without jeopardizing its quality level. There is need to make efficient the food and beverage sector because the sector is capable of increasing economic activities in several ways in both rich and poor regions of the world (Marc & Krishnaswany 2007).

Production planning may be helpful in resolving inefficiency in the food and beverage sector. Production planning is the systematic process which specify how the production resources of an organization can be utilized over some period of time (Gavett& Silver 1973). Stages of production by Kumar and Suresh (2008) are:

1. Planning: This is a logical way of setting out goals and how to achieve them under uncontrollable circumstances.
2. Routing: This deals with selecting of path or rate which the available raw material must take to be converted into finished products
3. Scheduling: This is the determination of the commencement of each operation as well as its completion date.
4. Loading: This deals with the association between load and capacity, so as to assign the work for the production.

Production planning enables organizations to effectively maximize the use of their resources which result in low cost and high rate of returns for the organization and enhance satisfactory services to customers. According to Martand (2013), production planning comprises material planning, manpower planning and machine planning. Banga and Sharma (2013) see material planning as a systematic procedure of setting up consumption need and working out the needs for all materials for any given manufacturing program, by determining all important issues such as make or buy available sources of supply, availability of stock and laying down

standards and specification. Ahiauzu (1999) stated that the achievement of our present day industries depend on how resources are managed so as to enhance growth and development. Furthermore, Ann, Christopher and Abibe (2012) asserted that poor planning and control of production systems as reasons behind non success of the manufacturing firms.

Operational efficiency, as a critical desire of organization has attracted several studies. Ann et.al. (2012) pointed out that most firms in Nigeria are contending with inefficiency as a result of environmental problems and imprecise decisions resulting from improper planning and control of the resources. Clinton, Jack and Thomas (2006) disclosed that inefficiency and lack of direction arises if there is no proper involvement in planning production. However, Chinweizu (1979) and Agbadudu (1996) identified inquisitiveness, beyond the ability of researchers, especially in Nigeria as explaining the scanty empirical studies on operational efficiency. Hence, we seek to examine the relationship between production planning in terms of manpower planning and material planning and operational efficiency in terms of cost minimization and capacity utilization in the food and beverage industry in Nigeria.

Theoretical Foundations

This work anchors its precepts on transaction cost theory. The origin of transaction cost theory could be traced to the work of Ronald Coase (1937). He believes that since goods and services are produced for consumers, for the exchange to be effective it must follow some political, social-economic and legal grand rules which defines what he refered to as institution. Conceived in this sense, the production, distribution and market exchange involve a host of hidden cost which include sale and employment contract, energy and skills which were conceived to be minimal in the medieval period (Douglass 1995). With the rise in the size and scale of trade and commerce, transaction cost increased (Douglass 1995). To enhance relative efficiency, the central control (command economy) gave way to price mechanism. While coase (1937) sees transactional cost as informal gathering cost and contracting cost, he equally sees the simple dichotomy of government structure as market coordinated by command. Organizations are out to make profit which is enhanced by their level of efficiency. For this to be actualized, the external transaction cost must exceed their internal transaction cost. In summary, transaction cost theory is that production, distribution and exchange of goods and services is actualized by the firm through different governance and hierarchy structure, to effect this production, distribution and exchange, there are myriad of hidden cost. These cost are what is seen as the transactional cost. It is a comparative position of the external and internal cost that defines whether a firm is efficient or not. A firm is said to be efficient if its external cost are higher than its internal cost. Since the classical objectives of every organization is to make profit, these organizations make effort to be efficient, thus make or maximize profit by ensuring that the external cost is higher than the internal cost. This work takes its root or foundation from this transaction cost theory considering that it is predicated on organizational efficiency or ways of enhancing organizational efficiency. Over the years, the term production has been defined by many scholars in different ways. Production is the transforming of inputs (factors of production) into an output (goods or services). Olusegun and Adegbuyi (2010), defined production as that which involves the conversion of raw materials or resources into finished product. Meredith (1992) defined production as the transforming of inputs into valuable outputs and thereby adding values to some entity.

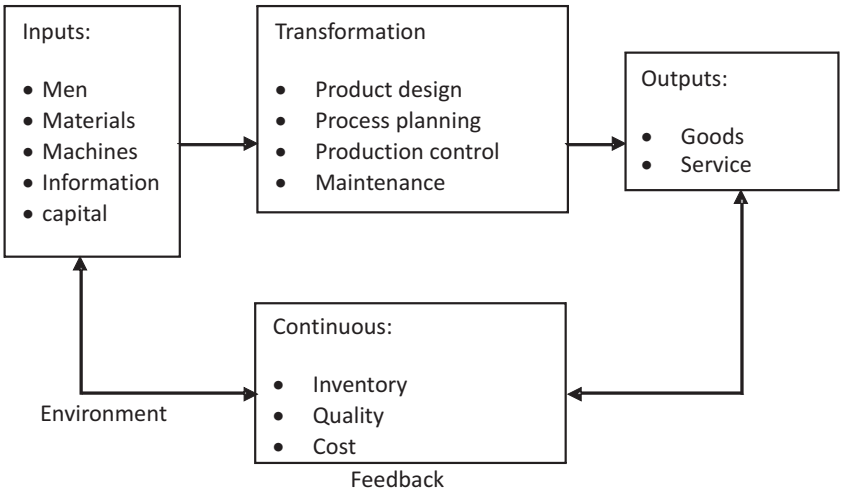
Types of Production:

According to Harcourt (2012) there are eight types of production, which basically may be classified or grouped into three (3) headings, according to the quantities involved. These are;

1. Job production
2. Batch production
3. Continuous production.

Job Production is the production or manufacture of goods to satisfy special orders of specific customer desires or requirements. It involves the production of small amount of quantity. Mac'Odo (2005) noted that high variety of product and low quantity are the features of job production. Batch production involve the manufacturing of an amount of related goods. It is either to satisfy special demand or to fulfil continuous request. In batch production, three types can be identified. These are; batch produced only once, batch produced repeatedly, batch manufactured intermittently at known interims. The production that involve the manufacturing of identical goods or product on which the equipment involve is totally or fully engaged is known as continuous production. Two categories of continuous production have been identified. These are; mass production and flow production. Mass production involve the manufacturing of bulky quantity of identical goods but the equipment employed for such goods are designed for such product alone. In flow production, the equipment has been mainly designed to produce the product of the organization. Tractability in the assortment of products for manufacture is possible with internal alteration in layout. Jain and Aggarwal (2008) observe that the strategy behind the production process as one that moves from the type and complexity of technology concerned to the magnitude of the product.

Production is the method established to convert a set of input into a stated set of output in order to attaining the aims of an organization (Vollman, Berry & Lallybark, 2007). From the assertion, production is the activity or process aimed at creating value through the transformation or conversion of necessary inputs to achieve desired output. Production is a procedure or planned procedure developed to convert a set of inputs into a specified set of output, thus achieving the objectives of an enterprise. The core of production is the manufacture of goods and services, through the transformation of materials. Production system is the designed process, for achieving the conversion of inputs into outputs, as shown below:



Source: Kumar, S.A. and Suresh. N. (2008): Production and Operation Management New, Delhi, New age.

Fig. 2.1: A production system

The factors of production as in Lipsey and Christal (2006) cited in Harcourt (**2012**) are made up of land (including the natural resources), labour, capital (Factories, building, Machinery tools, and raw materials) and entrepreneur. The relationship between output and these factors (inputs) in a production process is the production function of

$$OP = f(M_1, M_2, M_3 \text{-------} Mn)$$

Where: OP = Output

M_1, M_2, M_3 ----------Mn = input.

From the function, it is clear that output is totally not possible in the absence of input and the input in the system determine the expected output. Therefore, one can argue that input has a linear relationship with output in the production process. The production system has boundaries by which the entire organization is subdivided into functional subsystems. One subsystem will describe a single function or components of a function. Which may be executed by many persons or machines in different geographical locations. Furthermore, this system as an open system requires inputs from other sub-system, such as service inputs (maintenance, supervision, plant layout and design) and control inputs (measurements, data processing and forecasting).Production planning play a vital role in any manufacturing operation according to Huynh (2006). He asserted that the problem is to decide the type of product and the quantity of each product that have to be manufactured in the future. production planning as the determination, purchase and organization of all facilities necessary for future manufacturing of products (Wild 1980). kreitnar (1995) cited in Adetayo, Dioznco-Adetayo and Aladejo (2004) defined production planning as the tasks which involve formulating a resource conversion system that will appropriately meet the predicted request for goods and services. They therefore posited that it deals with forecasting production demand.

Production planning is that which deals with setting a detailed plan for production system over a long period of time according to Chase and Aquilano (1977). Furthermore, product time, and all resources needed to meet with demand in most cost effective manner must be considered when planning production. According to Gavett and Silver (1973), Production Planning is the systematic process stipulating how production means are to be engaged so as to achieve overall forecast of an organization. Banga and Sharma (2013) sees production Planning as a process by which manufacturing strategy is reached, information delivered for its implementation, and data gathered and note down. According to Sharma, Sharma and Sharma (2014), the major function of production planning are, estimating, routing, scheduling and loading. Banga and Sharma (2013) sees material planning as a systematic procedure of setting up consumption need and working out the needs for all materials for any given manufacturing program, by determining all important issues such as make or buy available sources of supply, availability of stock and laying down standards and specification. Inventory make up a large portion of an organization asset, therefore organization should properly plan their inventory. Material planning will enable an organization to know which raw materials are actually needed, at what quantity and at the appropriate time, since inventory make up large portion of organization assets, Umoh (2012) note that Careful inventory management is critical to the financial health of businesses whose primary venture is manufacturing or retailing.

Operational efficiency is a goal which every firm desires to achieve in their daily activities. Liao and Jimenez (2010) noted that operational efficiency has to do with waste minimization and enhanced cost effectiveness of

an organization. Any organization that is not able to manage their resources in order to eliminate or totally reduce waste to the barest minimum cannot in any way be efficient in their operations. Enhance cost of effectiveness will enable organization to be operationally efficient. Weimer (1999) cited in Harcourt (2012) revealed that operational cost is significantly high without adequate planning for production design and rework. Operational efficiency is the proportion between the input to run a business process and the output gained from the business. When there is increase, the output to input ration boost up. Operational efficiency is the ability of a firm to deliver products or services to its customers in the most cost-effective way possible while still ensuring the high quality of its products or service Sharma, Veshisth and Sharma (2014) defined operational efficiency as the ratio of actual output versus the maximum output and behave like financial leverage. They maintained that it notes or identifies wasteful processes and the resources that reduce the profit of the organization and can also provide a way out by ensuring new processes that drives quality and productivity. Sharma et al (2014) states that operational efficiency and lean manufacturing are both concern about eliminating waste as it regard people, time, money and other resources that are not productive. However, for operational efficiency to be achieve, firms must ensure that there is optimum capacity utilization and cost minimization.

Operational Framework

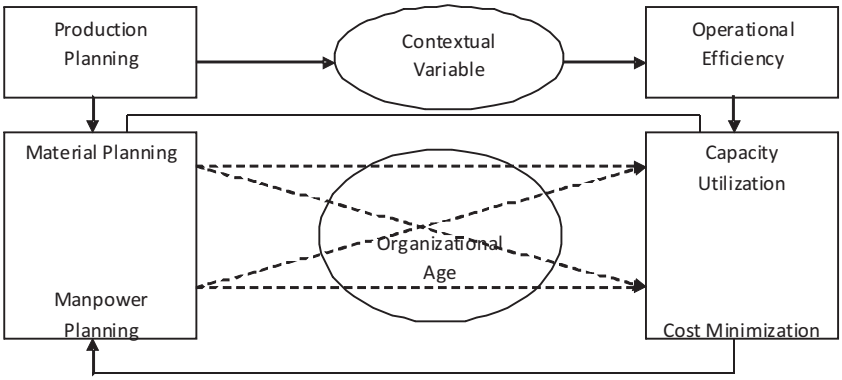


Figure 2.2Operational framework of production planning, operational efficiency and organizational age

***Source**: Operationalized by the researcher.*

Based on the operational framework, the following hypotheses were stated for this study;

HO_1: There is no significant relationship between material planning and capacity utilization in the food and beverage industry in Nigeria

HO_2: There is no significant relationship between material planning and cost minimization in the food and beverage industry in Nigeria

HO_3: There is no significant relationship between man power planning and capacity utilization in the food and beverage industry in Nigeria

HO_4: There is no significant relationship between manpower planning and cost minimization in the food and beverage industry in Nigeria

HO_5: Age of the firm does not moderate the relationship between production planning and operational efficiency.

Methodology

Research design

The cross-sectional survey a type of the quasi-experimental design was used, because the work is aimed at generating new facts without intentional manipulation of variables. This design will help show the relationship between production planning and operational efficiency. According to Nachimias and Nachimias (1981), the aim of cross sectional survey is to get a body of data relating to different variables and to identify patterns of relationship.

Population of the study

The population consist of food and beverage firms located in Port Harcourt, Rivers state. A total of Fifteen (15) food and beverage firms were identified. Copies of questionnaire where distributed to 45 respondents which comprise of human resource manager, production manager and financial manager in the fifteen food and beverages firms.

Data Analysis Technique

The spearman's rank order correlation coefficient statistical analysis was used in analysis the stated hypothesis and the partial correlation was used to analyze the moderating influence of organizational age through the use of Statistical Package for Social Science (SPSS) version 21.

Testing of Hypotheses

The hypotheses test is undertaken at a 95% confidence interval implying a 0.05 level of significance. All five hypotheses were all listed in the null form.

Decision Rule:

Where P < 0.05 = Reject the null hypotheses

Where P > 0.05 = Accept the null hypotheses

			MP	MAP	CM	CU
Spearman's rho	MP	Correlation Coefficient	1.000	.480**	.366**	.241**
		Sig. (2-tailed)	.	.000	.000	.001
		N	45	45	45	45
	MAP	Correlation Coefficient	.480**	1.000	.433**	.144*
		Sig. (2-tailed)	.000	.	.000	.040
		N	45	45	45	45
	CM	Correlation Coefficient	.366**	.433**	1.000	.558**
		Sig. (2-tailed)	.000	.000	.	.000
		N	45	45	45	45
	CU	Correlation Coefficient	.241**	.144*	.558**	1.000
		Sig. (2-tailed)	.001	.040	.000	.
		N	45	45	45	45

Table 4.1: Tests for bivariate hypotheses showing relationship between the variables (dimensions of Production Planning and measures of Operational Efficiency)

The Relationship between material planning (MP) and cost minimization (CM): the result of the data analysis reveals that the relationship between material planning and cost minimization is significant at a $P < 0.05$ level of significance where rho = .366. Therefore the null hypothesis is hereby rejected.

The Relationship between material planning (MP) and capacity utilization (CU): the result of the data analysis reveals that the relationship between material planning and capacity utilization is significant at a $P < 0.05$ level of significance where rho = .241. Therefore based on this result, the null hypothesis is hereby rejected.

The Relationship between manpower planning (MAP) and cost minimization (CM): the result of the data analysis reveals that the relationship between manpower planning and cost minimization is significant at a $P < 0.05$ level of significance where rho = .433. Therefore based on this result, the null hypothesis is hereby rejected.

The Relationship between manpower planning (MAP) and capacity utilization (CU): the result of the data analysis reveals that the relationship between manpower planning and capacity utilization is significant at a $P < 0.05$ level of significance where rho = .144. Therefore, based on this result, the null hypothesis is hereby rejected.

Control Variables			PP	OE	OA
-none-[a]	PP	Correlation	1.000	.569	.901
		Significance (2-tailed)	.	.000	.000
		Df	0	45	45
	OE	Correlation	.569	1.000	.521
		Significance (2-tailed)	.000	.	.000
		Df	45	0	45
	OA	Correlation	.901	.521	1.000
		Significance (2-tailed)	.000	.000	.
		Df	45	45	0
Age	PP	Correlation	1.000	.267	
		Significance (2-tailed)	.	.000	
		Df	0	45	
	OE	Correlation	.267	1.000	
		Significance (2-tailed)	.000	.	
		Df	45	0	

Table 4.2: Tests for Moderation

Where PP = production planning; OE = operational efficiency and age = organizational age.

Moderating effect of organizational age on the relationship between production planning and operational efficiency: the partial correlation analysis reveals a significant level of moderation by organizational age on the relationship between organization production planning and operational efficiency at a $P < 0.05$level of significance. So the null hypothesis is hereby rejected.

Discussion of Findings and Conclusion

The result of the analysis revealed that between production planning and operational efficiency that there is a relationship to a significant level; with findings further supporting a significant level of moderating effect of organizational age on the relationship between the variables.

The tests of the bivariate relations revealed that both dimensions of production planning (material planning and manpower planning) were significantly related with the measures for operational efficiency (cost minimization and capacity utilization). Cost minimization is a systematic way of delivering goods and services in the most cost effective manner without jeopardizing its quality level. Marc and Krishnaswany (2007), posit that the food and beverage sector is capable of increasing economic activities in several ways in both rich and poor regions of the world. Nagare (2007), noted that the peak of efficiency in production is achieved by manufacturing the essential volume of a product, by the best and cost effective method. From the analysis, it is clear that organizations that are able to properly plan there manpower and material resources can have an edge over competitors, as such will go a long way to enhancing capacity utilization and cost minimization. The findings further consolidate previous research by Umoh and Ify (2012); Weimer (1990) and Olusegun and Adegbuyi (2010)) in terms that highlighted the essence of improved layout of the workplace leads to rise in productivity of workers. The findings differ not from that of Higgins (2001) who stated that firms with effective production planning system perform better than those with poor approach as regarding performance measures.

The result for the multivariate analysis revealed a significant role of moderation by organizational age on the association between production planning and operational efficiency implying that organizational age; invariably enhances activities related to production planning unto outcomes and measures such as cost minimization and capacity utilization. This aligns with previous findings in Umoh and Ify (2012) that firms should properly plan there production activities irrespective of the size and age.

Conclusion and Recommendations

Planning of production in organizations, irrespective of its age is important for cost minimization and for optimal utilization of its installed capacity. When a firm vest more interest in ensuring that their production process is properly planned, such firms stand the chance of achieving optimal production and thus enhanced efficiency in operation. Based on the conclusion derived from this study, the following recommendations are hereby put forward:

i. That the food and beverage firms must embark on effective and formal planning of production activities in order to achieve operational efficiency.

ii. The food and beverages firms must embark on proper planning of manpower resources in order to attract, retain and utilize competent workforce, to win in the talent war.
iii. The food and beverages firms should leverage technology such as computer aided manufacturing to improve of cost and time savings.
iv. Food and beverage firms should adopt effective inventory management system to ensure maximum use of available materials and eliminate wastages
v. Food and beverages firms should benchmark their outputs against industry standards and develop innovative strategies for beating competition in a globalizing world.

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