THE NEXUS OF PRODUCTION QUALITY CONTROL AND THE PERFORMANCE OF SACHET WATER FIRMS IN BORI, RIVERS-STATE

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Abstract: *This study was targeted at examining the nexus between production quality control and the performance of sachet water firms Bori, Rivers-state. The key performance indicators of interest to the researchers include; operational efficiency, customer satisfaction and corporate growth. The study adopted the survey approach in its design and a five point likert scale questionnaire was the major tool for data gathering. The data gathered was analyzed with Mann-Whitney test (U) and spearman's correlation coefficient test using the 20.0 version of SPSS. The findings of the paper shows a high connectivity between production quality control on and the performance of sachet water firms in Bori as the three variables that were used to proxy performance showed different but all positive level of significant relationship. The researchers therefore recommend among others that sachet water firms in Bori should see and take production quality control as a strategic continuous process and not just one time event to secure regulatory approval.*

Keywords: *customer satisfaction, corporate growth, operational efficiency, production, quality*

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INTRODUCTION

Organizations today have awaken their consciousness in regards to the complexity and dynamism of their operational environment, the influence of consumerism, rapid technological innovations and adoption in production processes and high profile competitive nature of business environment. The regulatory environment in a bid to protect the interest of the consumers has also brought pressure on organizations; all these have brought about a rethink and a change of operational philosophy. Furthermore, the need for cost control and to ensure full plant capacity utilization has brought to the fore the question of process optimization. For organizations to ensure the quality of their products, a system of production quality control and product standardization must be made a significant and functional aspect of the organization. This therefore pre-supposes the existence of a production plan that is all encompassing but that is also

flexible enough to accommodate changes that may arise out of the dynamic nature of organizational environment.

Ballard and Gregory (2003) in explaining the concept of production quality control posits that it is the art and science of ensuring that all products are produced in accordance with the rules established and the instructions issued. Thus, production control regulates the orderly flow of materials in the manufacturing process from the raw materials stage to the finished stage. They averred that production control aims at achieving production targets, Optimum use of available resources, increased profitability through productivity and the production of better and more economic goods and services. In their view, vollman et al (2005) assert that a production control system is concerned with planning and controlling all aspects of manufacturing, including materials, scheduling machines and people and coordinating suppliers and customers. They posit that effective production control system is critical to the success of any company, therefore, the design should not be a one-off undertaking, and it should be adaptive to respond to changes in the competitive arena, customer requirements, strategy, supply chain and other possible problems.

The dictionary of scientific and technical terms (2003), defined as the systematic planning, coordinating and directing of all manufacturing activities and influences to ensure having goods made on time, of adequate quality and at reasonable cost. It is the procedure for planning, routing, schedule, dispatching, and expediting the flow of materials, parts, sub-assemblies and assemblies within the plant from the raw state to the finished product in orderly and efficient manner. In explaining the influence of production quality control on organizational performance, Kanawaty (1992), States that planning the manufacture of products in the desired quantity and quality is a crucial issue in production management, however, even the best conceived plans can go haywire because of delays, low inventories and machinery breakdowns. Consequently, there is a need for control over the operations to signal deviations from plans and trigger corrective measures. Alfred (2011) posits that quality control is a process that is used to ensure a certain level of quality in a product or service. It might include whatever actions an organization deems necessary to provide for the control and verification of certain characteristics of a product or services. Philips (2008) in his view defined quality control as a process by which entities review the quality of all factors involved in production. The definition of the variables in the independent variable shows that quality control is a critical element in the success history of manufacturing organizations.

In explaining organizational performance, the Wikipedia (2011) defined it as comprising the actual output or results of an organization as measured against outputs (or goals and objectives). According to Richard et al (2009) organizational performance encompasses three specific areas of firm outcomes which include:

a). Profitability (profitability returns, on assets, return on investment, etc).
b). Product market performance (sales, market share, etc) and,
c). Shareholders return (total shareholder return, economic valued added etc).

In Nigeria, the sachet water industry has emerged as one of the fast growing industry, however, the problem of quality of the water packaged for Nigerians have received mind bugging criticisms, this is evident in the number of sachet water plant been shut down by NAFDAC and SON across the nation for failing to meet minimum acceptable quality standard. In Rivers-state generally and in Bori particularly, people see sachet water industry as the easiest to start due to its little capital and technical requirement. But the improved customers' awareness and intensed

competition have seen sachet water firms not just to see production quality control as regulatory duty but a strategic tool. To this end, this paper therefore shall investigate the relationship between production quality control and the performance of sachet water firms in Bori Rivers-state. The study shall specifically focus on;

i. Examining the relationship between production quality control and the operational efficiency of sachet water firms in Bori Rivers-state.
ii. Examining the relationship between production quality control and the customer satisfaction of sachet water firms in Bori Rivers-state.
iii. Examining the relationship between production quality control and the corporate growth of sachet water firms in Bori Rivers-state.

Hypotheses

The following assumptions were raised in this study

H_{01}: the relationship between production quality control and the operational efficiency of sachet water firms in Bori Rivers-state.
H_{02}: the relationship between production quality control and the customer satisfaction of sachet water firms in Bori Rivers-state.
H_{03}: the relationship between production quality control and the corporate growth of sachet water firms in Bori Rivers-state.

Review of Literatures

The term production quality control has attracted diverse explanation, meanings and definitions. According to Ballard and Gregory (2003), production control is an art and science of ensuring that all products are produced in accordance with the rules established and the instruction issued. Thus, production control regulates the orderly flow of materials in the manufacturing processes from the raw material stage to the finished product. Production control aims at achieving production targets, optimum use of available resources, increase profitability through; better and more economics goods and services. To Bertrand and Wijngeard (2005), production quality control refers to the coordination of production and distribution activities in a manufacturing system to achieve a specific delivery reliability at minimum cost. The business dictionary (2011) defined it as the activities involved in handling materials, parts, assemblies and sub-assemblies from their raw or initial stage to the finished product stage in an organized and efficient manner. It may also include activities such as planning, scheduling, routing, dispatching, storage e.t.c. Buffa (2008) posits that quality control may be defined as the process of planning production in advance of operations; establishing the exact route of each individual item, assembly and the finished products, and releasing the necessary orders as well as initiating the required follow-up to effectuate the smooth functioning of the enterprises. In the view of Dilworth (2004), production control is the function of management which plans, directs and controls the material supply and processing activities of an enterprise, so that specified products are produced by specified methods to meet an approved sales programme.

Hamond (2007) opined that production quality control is the process for maintaining standards and not for creating them. Standards are maintained through a process of selection, measurement and correction of work, so that only those products or services which emerge from the process

meet the standard. Akanwa and Agu (2011) posit that quality control can be defined as the maintenance of appropriate level of quality in the products and services offered to the customers. The definitions and explanations offered above shows that are significant elements in determining the performance level of the organization.

Benefits of Production Quality Control

In discussing the importance and benefits of quality control, Desai (2004) posits that a sound system contributes to the efficient operation of plant. In terms of manufacturing customer orders, it assures a more positive and delivery date. Delivering an order on time is obviously important to the customer and the development of customer goodwill. Production control also brings plan order to a chaotic and haphazard manufacturing procedure. This does not only increase the plant efficiency but also makes it a more pleasant place in which to work. Furthermore, most people recognized that employees prefer to work and do better work under conditions of obvious control and plan, and morale may be considerably improved. Effective production quality control also maintains working inventories at a minimum, making it possible for a return in both labour and material investment. Thus, quality control helps a company operate and produce more efficiently and achieve lowest possible costs. In the view of karmarker and shidasani (2004), production quality control is the nervous system of a plant; they averred that it is essential in all plants irrespective of their nature and size. They articulated the following as the importance and benefits of production quality control;

- *Better Services to Customers:* Through proper scheduling and expediting of work, better services in terms of better quality of goods at reasonable price and delivery time is achieved. Delivery in time and proper quality, both help in winning the confidence of customers, improve relation with customers and promote profitable repeat order.
- *Fewer Rush Orders:* In an organization where there is effective system, production moves smoothly as per original plan and match the delivery date. Consequently, there will be fewer rush order in the plant and less overtime.
- *Better Control of Inventory:* A sound system helps in maintaining inventory at proper levels thereby minimizing investment in inventory. It requires lower inventory of work-in-progress and less finished stock to give efficient services to customers. It also helps in exercising better control over raw material inventory, which contributes to a more effective purchasing.
- *More Effective use of Equipment:* An efficient system of makes for the most effective use of equipment. It provides information to the management on regular basis pertaining the present position of all orders in process, personnel and equipment requirement for the next few weeks. The workers can be communicated well in advance if any retrenchment, lay-off, transfer e.t.c. is likely to come about. Also, unnecessary purchases of equipment and materials can be avoided. Thus, it is possible to ensure proper utilization of equipment and other resources.
- *Reduced Idle Time:* Product control helps to reduce idle time i.e loss of time by workers waiting for materials and other facilities, because it ensures that materials other facilities are available to worker on time. To Jaikumar (2003), other significance (importance) of are;
- *Improved Plant Morale:* An effective system of co-ordinates the activities of all the departments involved in the production activity. It ensures even flow of work and avoid rush orders. It ensures healthy working conditions in the plant.
- *Good Public Image:* A proper system of is useful in keeping systematized operations in an organization. Such an organization is in a position to meet its orders in time to the satisfaction

of its customers. Customer's satisfaction leads to increased sales, increased profitability, industrial harmony and ultimately, good public image for the enterprise.

The Production Quality Control Techniques

Flores (2002) posits that production control techniques can be seen in the various types of production. These production method are;-

Job method: With job method of production, the complete task is handled by a single worker or group of workers. Jobs can be small-scale/low technology as well as complex/high technology. In low technology jobs, the organization of production is extremely simple, with the required skills and equipments easily obtainable. This method enables customer specific requirement to be included as the job progress. On the other hand, high technology jobs involve much greater complexity and therefore present greater management challenges. The important ingredient in high-technology job production is project management, or project control. One of the essential features of good project control for job is clear definitions of objectives i.e. how should the job progress [milestone, dates, stages.

Batch Method: As business grows and production volume increases, it is not unusual to see the production process organized so that batch method can be used. Groeuvelt and Hall (2009) assert that batch methods required that the work for any task is divided into parts or operations. Each operation is completed through the whole batch before the next operation is performed. By using batch method, it is possible to achieve specialization of labour. Capital expenditures can also be kept lower through careful cost control and the batch method ensures that equipment is not idle. The main aim of the batch method is; to connect the skill (specialization), and to achieve high equipment utilization. Dobson et al (2008) averred that batch methods are not without their problems, these problems includes;

(1). There is a high probability of poor workflow, particularly if the batches are not of optimal size or if there is a significant difference in productivity by each operation in the process.

(2). Batch methods is often result in the build, build up of significant work in progress or stocks (i.e. completed batches waiting for their turn to be worked on in the next operation).

Flow Method: According to carboy et al (2000), flow methods are similar to batch methods, except that the problem of rest/idle production/batch queuing is eliminated. They defined flow method as a method of production organization where the task is worked on continuously or where the processing of material is continuous and progressive. Flow method also means that as work on a task at a particular stage is complete, it must be passed directly to the next stage for processing without waiting for the remaining tasks in the batch. When it arrives at the next stage, work must start immediately on the next process. In order for the flow to be smooth, the time that each task requires on each stage must be of equal length and there should be no movement off the flow production line. Huang et al (2003) posits that the requirements for the flow methods to work well are;- (1). There must be substantial and constant demand (2) The product and/or production tasks must be standardized (3) Materials used in production must be to specification and delivered on time (4) The output from each stage of the flow must conform to quality standards

Types of Production Quality Control Systems

According to karmarker (1991), product control system can be broadly classified into pull and push system. They posit that the difference is in the way in which the order release function is achieved in the control scheme.

Pull Control System: A Pull control system is defined as one in which order release occurs due to physical removal of finished inventory. This means that production is authorized by material withdrawal from the output inventory of the production system, stage or cell. The pull system according to Williams (2006) is the order quality approach which incorporates a batch size decision and which assumes knowledge about production lead times. Here, it is also assumed that production lead times are fixed. Furthermore, all items being controlled by this method are fixed independently. Unlike make-to-order, the system has the ability to respond to demand information. Average demand rates are used in making the order quantity calculation, and the variance over lead time is used in setting order points and hence safety stocks. The make-to-order system essentially entails no systematic information of any sort either of demand or of production characteristic.

Procedural Control: Under the procedural control, the following techniques are involved; planning; routing, scheduling and dispatching

Performance Control: This utilizes many techniques such as planning board, progress charts, standards and inspectors.

(i) The Planning Board;- Management uses the planning board as a control tools when many time of work are in progress. The planning board display detailed plan of jobs in progress, jobs to be undertaken when the one in progress is completed and job orders that are yet to be scheduled. A separate record for each machine is also shown on the planning board. It gives the departmental supervisor an at- a glance view of what his unit is expected to do at the beginning of each day or week.

(ii) Progress Charts;- A progress chart is a graphical representation of the details of the manufacturing process. It is usually displayed on the bulletin board or on a wall. It shows when each job must commence, the number of unit to be produced and the date of completion of the job

(iii) Standard: Standards are part of the control mechanism which the firm adopts to determine uniform method of performance. Standards are established for quality and for working conditions, and to show the amount of time required to accomplish a particular job. The latter provides data that is useful for scheduling.

(iii) Inspection: Inspection plays a vital influence in the production process to enforce standards. All other activities are used if the finished products are defective. Once standards have been set, management must decide what kind of inspection to adopt (visual, tests etc), how often it will take place, at what points in the production process to enforce standards. All other activities are used if the finished products are defective. Once standards have been set, management, must decide what kind of inspection to adopt (visual, tests etc) how often it will take place, at what points in the production process it should occur, and which standards should be adopted at each point of inspection. It may be necessary to inspect every item produced (if the items are few and specialized) or only a small sample of the total output (in the case of small, standardized products of mass production).

Organizational Performance

A business entity nowadays, has to be efficient in order to perform and stay in business. Many experts define performance in different ways. Watkins (2007) defined performance as valuable results, accomplishments or contributions of an individual/team or an organization, regardless of preferred or mandated processes. Enos (2007) defined performance as achievement of tangible, specific, measurable, worthwhile and personally meaningful goals. Efficiency measurement is

one aspect of a company's performance. Efficiency can be measured with respect to maximization of output, minimization of cost or maximization of profitability. A company is regarded as technically efficient if it is able to obtain maximum outputs from given inputs or minimize inputs used in the production of given outputs. The objective of producers is to avoid waste. Various studies have been carried out to examine the performance of companies. Many studies have used financial ratios such as sales (Wang, 2003), return on assets (Lin et al. 2005; Naser and Mokhtar, 2004), return on equity (Ponnu and Ramthandin, 2008), and return on invested capital (Hsu and Liu, 2008).

Measuring the efficiency is essential for this purpose as efficiency is an important characteristic of organizational performance. In order to compete with other firms in international market, business organizations such as manufacturing companies, firms, private companies whether big or small organizations must reach to their optimal performance. Therefore, one of the major objectives in today's world of business is to improve the performance (Mohamad and Said, 2010). Every country needs to see their organizations performing well with maximum efficiency and productivity. Hence, it is the focus of all organizations to achieve this target in order to meet their goals.

Measuring Organizational Performance

According to Robert (2004), there are five measures of organizational performance. The four primary categories of overall organizational performance variables used in recent empirical research identified include (1) accounting measures, (2) operational measures, (3) market-based measures, and (4) survival measures. In addition, measures of economic value creation are popular in practice but are not frequently used in strategic management or entrepreneurship research. Ford and Schellenberg (1982), developed three models for understanding organizational performance. These models are:

The Goal-Based Model: The goal-based approach proposes that a firm is said to have performed when it accomplishes its own unique set of goals. This approach rejects the premise that an organizational performance can be universally defined or measured in terms of a static set of measures. The problem with the goal-based approach to performance measurement is that the organization's stakeholders may have conflicting sets of goals and objectives for an organization. Finally, and perhaps more importantly, different organizations have varied and sometimes contradictory goals, making generalization across firms questionable.

The Multiple Constituency Model of Performance: According to Barney (2002) in the multiple constituency view of organizational performance, a firm's performance is evaluated in the context of its ability to meet the objectives of stakeholders who provide resources to the organization. However, because different stakeholders provide different resources with differing utility to the organization, they can have different interests in how the firm is managed. In such situations, the interests of stakeholders who provide more critical resources to the firm will be placed above the interests of other less critical stakeholders. The key to using a multiple constituency approach is to determine what constituencies exist, how each of the constituencies views performance, and the consequences of these assessments. From this evaluation, a set of performance criteria can be derived for each organization.

The Systems Model of Performance: The systems approach to measuring effective organizational performance considers multiple, generic performance measures. The systems approach suggests

that performance is multi-dimensional, and must be examined using a set of measures simultaneously, which are appropriate to the population and phenomenon of interest, to allow for comparison across organizations. As with the goal-based approach, this model of performance is criticized for failing to adequately account for differences between stakeholder groups' perspectives on performance (Ford and Schellenberg, 1982). While it can be argued that the use of multiple measures is also appropriate to goal-based models of performance, without specifically connecting performance measures to explicit organizational goals, the use of a system of measures to represent performance is more correctly classified as a systems approach. Though there is no widely accepted one best model, it is common in industry and research to find a mix of organizational performance measurement been used at a time.

Methodology

In conducting this study, the researchers adopted a descriptive survey approach; owing to the terrain of the research site and to the fact that the data sought is a homogenous one. Organizational performance was proxied by operational efficiency, customer satisfaction and corporate growth and a five point likert scale questionnaire was the major tool for data gathering. The study covered a sample of 15 management staff of three sachet water firms and 187 members of different households who are regular customers of sachet water. The data gathered was then analyzed using Mann-Whitney test (U) and spearman's correlation coefficient test using the 20.0 version of SPSS.

Results and Discussions

The tables below shows the SPSS of the analysis of the data gathered on the three hypotheses stated in this study

Hypotheses One

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
IDV	404	4.0371	.74628	1.00	5.00
Group	404	1.5000	.50062	1.00	2.00

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
IDV	Production Quality Control	202	190.21	38422.00
	Operational Efficiency	202	214.79	43388.00
	Total	404		

Test Statistics[a]

	IDV
Mann-Whitney U	17919.000
Wilcoxon W	38422.000
Z	-2.308
Asymp. Sig. (2-tailed)	.021

a. Grouping Variable: Group

Hypotheses Two

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
IDV	404	4.0272	.75002	1.00	5.00
Group	404	1.5000	.50062	1.00	2.00

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
IDV	Production Quality Control	202	189.02	38182.50
	Customer Satisfaction	202	215.98	43627.50
	Total	404		

Test Statistics[a]

	IDV
Mann-Whitney U	17679.500
Wilcoxon W	38182.500
Z	-2.532
Asymp. Sig. (2-tailed)	.011

a. Grouping Variable: Group

Hypotheses Three

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Production Quality Control	202	1.00	5.00	3.9406	.78951
Corporate Growth	202	1.00	5.00	3.9109	.87644
Valid N (listwise)	202				

Nonparametric Correlations

Correlations

			ProductionQualityControl	CorporateGrowth
Spearman's rho	ProductionQualityControl	Correlation Coefficient	1.000	-.182
		Sig. (2-tailed)	.	.009
		N	202	202
	CorporateGrowth	Correlation Coefficient	-.182	1.000
		Sig. (2-tailed)	.009	.
		N	202	202

Conclusion

This study has investigated the relationship between production quality control and the performance of sachet water firms in Bori. Results from the analysis shows that there is a significant positive relationship between the variables under study. However, it is still a thing of regulatory strain to enforce quality practices in these firms. This study therefore concludes that while the benefits of production quality control is known, ignorance and lack of technical and financial capabilities has hindered many sachet water firms from maximizing these benefits.

Recommendations

Sequel to these benefits, the researchers recommends as follows;

i. Regulatory bodies should go beyond standard enforcement and adopt proactive measures that can create information linkage that can enhance the capabilities of sachet water firms
ii. Managers of sachet water firms in Bori should see and take production quality control as a strategic continuous process and not just one time event to secure regulatory approval.

iii. Owing to cost involvement, government should encourage and support sachet water firms to procure technologies and skills that are needed for production quality control
iv. There is need for sachet water firms to establish effective customer service desk in order to quickly resolve quality complaints that may affect customers' satisfaction

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