# Effects of Manufacturing Firm's Capacity Planning on Performance of the Firm

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**Abstract: This study investigated capacity planning and performance in the manufacturing sector in the Southeastern States of Nigeria based on selected Brewing industries. The population of the study was 740 staff of the brewing industry in South-Eastearn Nigeria. The sample size of 509 was obtained using a Taro Yamani's statistical formula. The study used questionnaire and oral interview guide for data gathering. A test- retest stood completed using Spearman's rank correlation, giving a coefficient of 0.9. Findings revealed that capacity planning significantly enriched economic performance of the industry studied. There existed a strong affirmative relationship among capacity necessities planning and resources requirements planning. The paper suggested use of capacity planning as a technique to improve all performance factors. Similarly, performance advantage subsist from the correlation of volume requirements plans and resources requirements planning. The paper summarily held the position that volume preparation improved the economic performance in the industry under review. This inferred that goals achievement is possible. Likewise, the finding of substantial constructive association between volume supplies planning and resources supplies planning inferred an affirmative communication between the variables. This meant that resources supplies planning which was a method of organizing the detailed production plans could lead to an improvement of capacity supplies planning. That is to say, they are taking future decisions on the substances required for production capability of the brewing facility.**

**Keywords: Capacity Planning, Employee, Economic Performance, Manufacturing, Brewing, Firm**

## 1. Introduction/Research Background

In industrial economics, manufacturing is defined as an aspect of industry in which products, unused merchandises and facilities are produced (UNDP, 2012). According to Skinner (1985), there are five periods of industrial history as distinguished in industrial economics and these highlights advancement of manufacturing management into 1780 to 1950 manufacturing leaders as technology capitalists, 1850 to 1890 manufacturing leaders as architects of mass production, 1890 to 1920 manufacturing management as movers in the organization, 1920 to 1960 manufacturing administration polishes its services in guiding and steadying and 1960 to 1980 quaking the basics of manufacturing administration.
During the primary ages of the industrial revolution, production began to change from low volume activity to larger-scale operations. Management of the aforementioned operations remained essentially in

the hands of top management with the aid of overseers. Working conditions during that cycle were often abysmal.

Manufacturing processes became very difficult to be handled by top management personnel only. Scientific management methods hosted around the turn of the century involved then, were merely breaking a task down into its various components. These techniques are probably less scientific than just orderly. With the new levels of complexity, the single plant foreman had difficulties in coordinating strains of producing a varied product line and changing production schedules.

In 1989, Nigeria policy of using local inputs such as sorghum and corn instead of malted barley negatively affected a portion of the breweries (Continental Breweries Plc, 2011). The distilling companies then (Nigerian Breweries and Guinness Nigeria Plcs) hinge on the support of the Originating Corporations. In Nigeria, the Distilling Industry trusted on bulk development for meeting the enlarged request aimed at beer, stout and malt products through Request Predicting and Volume Supplies Preparation (Guinness Nigeria Plc, 2011; Nigerian Breweries Plc, 2011).

In terms of capacity planning, direction has been to increase access to breweries across Nigeria. Guinness Nigeria Plc established a Brewery in Lagos in 1963. Hence the establishment of various distilling firms at Aba Benin Ikeja Jos and Ogba (Nigerian Breweries Plc, 2011; Guinness Nigeria Plc; 2011). Production capability therefore is viewed from inputs, throughput and outputs of capacity. Building proper capacity rallied around volume planning geared towards formation of the permitting environment through suitable strategy, lawful backgrounds and official growth including community evolution (of women in particular). Organizations like UNDP identifies the fact that human resources development has the capacity of building a long-term, enduring process, in which all participants partake (MDAs, NGOs among others, (UNDP/ UNDOALOS, 1994).

Capacity structure is very essential for volume preparation. Planning is about looking ahead in advance to regulate what is to be done, when, where, how and who will be responsible for that act. In that it bonds the gap from anywhere we stand to future expectations in any business building and performance. It is continuous, periodic managerial activities and reduces uncertainty. The creation capability of a facility measured against inputs, throughput and outputs here is called Capacity. By 2000, there was a Strategic Partnership with the Secretariat of GEF through UNDP, used to launch the Initiative in capacity development was followed in 2002 with the World Summit in Sustainable Development (WSSD). Ultimately, the Assembly which was GEF second, reiterated the precedence of building and sustaining the capacity of development countries. Capacity building holds its roots beyond global assistance effort. More recently, the term is being used by governments to transform community and industry approaches to social and environmental problems.

Generally, over a space of five years, a broader conceptual framework has emerged. This approach is progressively being adopted by the development cooperation community. It entails a different dimension where System Perspective addresses various heights of conservational administration capacities (i.e. capacities of organizations, persons, overall republics and states). This approach lays greater importance on the *capacity development process* itself, on local ownership of its process and on equal partnership in

its support (Pennings, 1975).Capacity building encompasses growth of human resource, the growth of organizations and endorsing the rise of an overall policy environment, conducive to the suitable replies to evolving wants of the emerging generations (UNDP/UNDOALOS, 1994).

### 1.1 Statement of the Problem

The resolve of the grade to which capacity planning enhanced performance in the brewing firms in Southeastern Nigeria possess a difficulty from the beginning of distilling industry in Nigeria in 1946 to date. This difficulty culminated to other tasks in establishing the association between size requirements planning and material supplies planning and the extent to which capacity planning sustains organizations' competitive advantage. It is these challenges that are to be addressed in this study.

Capacity planning problem of a distilling firm would make it have less production in Lager beer, Stout and Malt than is demanded by the present and potential customers. A unique way among the numerous ways of solving this problem is to build a new brewery firm. The decision which is a long term, will raise new issues of plant location, plant layout, selection and intention of the product, selection of equipment and processes, production design of items processed, and job design. If these issues are not properly handled, performance will be undesirably affected. This is why the topic on economic volume planning and performance in the industrialized area considering the experiences of distilling industry in the Southeastern States of Nigeria is apt.

### 1.2 Research Questions

i. To what extent does capacity planning enhances performance in the distilling industry in South Eastern Nigeria?
ii. What nature of relationship exists between capacity and material requirements planning?

### 1.3 Objectives

i. To evaluate capacity planning and performance in the distilling industry in Southeastern Nigeria.
ii. To assess capacity and materials requirements planning.

### 1.4 Research Hypotheses

i. Capacity planning to a large degree does not enhance performance in the distilling industry in South Eastern Nigeria.
ii. There is no significant relationship between capacity and material requirements planning.

## 2. Literature Review

### 2.1 Capacity Planning

Guinness Nigeria Plc (2011), defines capacity planning as the extent to which decisions are taken and forecasting is made on the production capability of the facility for brewing stout and lager beer and

producing malt with the application of raw materials: malted barley, hops, yeast, and water. Brewing in Guinness was done with the first account in 1759 by Mr. Arthur Guinness at St. James's gate in Dublin Ireland. Brewing had been done earlier outside Guinness.

Bulk is intended thus:
$(\text{number of machines or workers}) \times (\text{number of shifts}) \times (\text{utilization}) \times (\text{efficiency})$. The classes of capacity planning includes lead strategy, lag strategy, and match strategy. More so, Capacity planning often is considered a long-term decision that launches a firms' overall level of capitals. It goes beyond timelines and stretches far enough to get capitals. Capacity positions upset the creation lead time, client sensitivity, working price and corporation aptitude to contest. Insufficient capacity planning can result to the forfeiture of the client and business.

Surplus capacity can sewer the business's incomes and stop savings going into other ventures that are more lucrative. There are issues of critical decisions regarding the enquiry of when capacity should be improved and by how much (Hill, 2006). Looking at a production scheduled to produce 500 pieces of product A on a machine having a cycle time of 30 seconds and the Over-all Equipment Effectiveness (OEE) for the procedure is 85%, then the time to produce the parts would be calculated mathematically as follows:

(500 parts x 30 Seconds)/85% = 17647.1 seconds. The OEE guide sorts it easy to determine whether we have sufficient capacity to run the required production. Considering this example, 4.2 hours at normal against 4.9 hours founded on the OEE index (Lazowska et al., 1984). Basically, the plain steps to developing a capacity plan can be shown as follows:

1. Determining service level requirements.
    a. Defining workloads
    b. Determining the unit of work
    c. Identifying service levels for each workload
2. Analyzing current system capacity
    a. Measuring service levels and compare to objectives
    b. Measuring overall resource usage
    c. Measuring resource usage by workload
    d. Identifying components of response time
3. Planning for the future
    a. Determining future processing requirements
    b. Planning future system configuration.

Capacity planning is important because it makes the manufacturing organization to determine the manufacture competence of the facility (Stephenson, 2004). This will enable the organization to have the suitable throughput. By having the suitable throughput, the creation process will be properly ascertained. It will contain of the proper equipment, systems and upkeep (Vollmann, Cordon & Heikkila, 2000).

**2.2 Performance**

Performance factors include efficiency, effectiveness, productivity, profitability, solvency, leverage, activity and morale (Nwachukwu, 2006). Effectiveness and/or efficiency is concerned with measuring the ability of inputs to produce outputs, or relationship between performances. Standard efficiency is concerned with the slit amid actual performances and expected, and between results and efforts (Abernathy & Townsend, 2005).

Productivity is the measure of how well resources are brought together in organization and utilized for accomplishing a set of results. It is attainment the uppermost level of performance productivity in a public expenditure or resource. To operationalize productivity in a public enterprise the ratio of total output to total input is very handy.

Total input is the naira value of all the factors of production for that year which include land, labour and capital. The restraint of this technique of operationalizing productivity is that entrepreneurship which is the facet of production is usually difficult monetarily to quantify.

Profitability or the ability of the enterprise to make profit. Turnover is the income or the difference between sales revenue and total cost. Valuation of the enterprise is summarized under profitability. Certainly the rudimentary unbiased of measurement of profitability is to provide a valuation, the enterprise which will be a critical assessment of the worth of the investment.

Solvency is the ability of an enterprise to encounter its immediate financial obligations and thus circumvent the option of insolvency. It is measured in current and acid test ratio (Premier Breweries Plc, 2011). Morale is the state of mind which makes men do great things (Nwachukwu, 2006). The movement of morale includes the following: Polarization, Autonomy, Flexibility, Potency and Participation. Polarization is the mark to which the group is oriented towards goals that is clear to the members and share by them.

Autonomy is the grade to which a group determines its own activities and takes its decision. Flexibility is the notch to which the group's activities are mark as informal rather than formal procedures. Potency is the nick to which the individual needs are satisfy by membership in the group it. Participation is the degree to which members of the groups at themselves to the assigned duties (Nwachukwu, 2006; Uyimmadu, 2008).

Leverage is a quota of what way for the total capital of the enterprise is borne by low term debt. In operationalizing the leverage of privatized public, two ratios come in hand namely, (i) gearing of leverage ratios which is long term debt as a fraction of share capital; and (ii) gearing or leverage ratio which is longer term as a fraction of share capital. Activity is demarcated as the use made of resource by the enterprise. Manufacturing is the process of converting raw materials, components, or parts into finished goods that meet a customer's expectations or specifications. The index of manufacturing production increased by 2.6 per cent to 182.7 (1985 =100) in 1992 compared with 9.3 per cent in 1991 (Chen & Paulraj, 2004). The increase was reflected in all the quarterly indices which remained usually

advanced than those of the preceding year, except the second quarter where the index declined slightly by 0.2 per cent. The share of the subset in the Gross Domestic Product (GDP) rose from 8.4 per cent in 1991 to 8.6 percent in 1992 (CBN, 2002).

Brewing is the making of cocktail through soaking an arrowroot source (commonly cereal grains) in aquatic and formerly fermenting with yeast. A brewer carries out this task in a brewery as it is practiced in most developed economies. The act of Brewing has taken place since around the 6$^{th}$ millennium BC. This assertion archaeological evidence suggests was a technique used in most emerging civilizations including ancient Egypt (Arnold, 2011).

**2.3 Empirical Review**

Bell (2006) worked towards improvement of the distribution of industrial gases with online computerized Routing. He observed that distribution was very important in materials management. Other significant supplies managing activities included, purchasing, production and inventory control, storage and warehousing and distribution.

Distribution had to do with transportation of raw materials, parts, sub-assemblies, semi-finished goods and finished goods since the fact of invention until they get to the final consumers. His discovery was that the starting point in distribution is to know the capacity or the making competence of the goods that are being transported. Capacity planning became very important in distribution if corporate objectives had to be achieved. So capacity planning as a distribution function had a positive effect on performance in many goods industries.

Karmarker (1989) worked on capacity loading and Release Planning with work in progress and lead times. The main objective of his study was to determine the nature of the relationship between capacity requirements planning materials require planning using work in progress. Materials requirements planning is a method of coordinating detailed production plans and it is a multi-stage process which begins with a master's schedule and works backwards to determine when and how much components will be needed. It gives the time for placing orders and similarly other aids is required considering the limited time.

Capacity necessities preparation to give the volume of the constituents that are required both at the ordering and receipt stages. It utilizes the time-faced materials plan information shaped by a material necessities idea system. This includes consideration of all actual lot sizes and lead times for both open-shop orders (scheduled receipts) and others plan for future release (planed orders). Karmerker found that there was a positive rapport between capacity supplies development and materials supplies development in the industrial industry in Los Angeles, USA.

**3. Theoretical framework**

This study in spite of contingency, or situational management and aggregate planning models, supply chain model (scm) will be applied due to its dynamic approach to optimization problems. Two major

optimization problems in supply chain management are extended period capacity planning (static problem), and short term inventory control optimization (a dynamic problem). In volume preparation, the whole assembly of the supply chain sites and dimensions of factories, warehouses, roads, etc is decided (within constraints). In record optimization, we take the assembly of the SS chain as fixed, and decide possibly in real-time who to order from, the order measures, etc. The challenge is to perform these optimizations under uncertainty (Sheu & Wacker, 2001).

A supply chain is a network of suppliers, production facilities, warehouses and end markets. Capacity planning decisions involve decisions concerning the design and configuration of this network. The decisions are made on two levels: strategic and tactical. Strategic decisions include decisions such as where and how many facilities should be built and what their capacity should be. Strategic verdicts include where to acquire the raw-materials from and in what quantity and how to distribute finished products. These choices are long range decisions and a static model for the SS chain that receipts into explanation combined demands, supplies, capacities and costs over a long period of time (such as a year) will work (Sheu & Wacker, 2001).

From a theoretical viewpoint, this flow model (Buffa & Ross, 2011) is the natural formulation for volume preparation. However, in practice, a quantity of non-convex restraints like cost/price breakpoints and binary 0/1 facility location choices modification the problem from a normal LP to a non-convex LP problem, and heuristics are essential for procurement solution even with state-of-the-art programs like CPLEX optimization software. Theoretical results on the quality of capacity planning results do exist, and refer mainly to efficient usage of resources relative to minimum bounds. For example, the total installed volume can be likened with reverence to the actual usage (utilization), total cost with respect to the least likely to meet a certain demand, etc.

### 3.1 Theories of Performance

Performance occupies a key interface between organization behavior, strategy and international management. In organization behavior, the position of performance in the structural contingency theories and research studies was marginal. There are numerous replicas but the Aguinis Performance Running Classification Theory will be used because of its organizational attributes would be used.

### 3.2 Aguinis Performance Management Theory

Performance administration is an incessant procedure of classifying, calculating and emerging the performance of individuals and bring into line performance with the strategic goals of the organization" (Aguinis, 2009). Performance administration is many times misguided as performance assessment but the latter is just a part of the previous. There is no single universally accepted model of performance management. Various experts have explained the concept in their own ways. Mabey and Gooderham (2005) have prescribed the model of performance management system in the form of 'performance management cycle'. This series has 5 rudiments which propose in what way performance management scheme should be applied in a group. The fundamentals of performance management system cycle includes: setting of objectives, measuring performance, feedback of performance results, reward system

based on performance outcomes and amendments to objectives and activities (Mabey & Gooderham, 2005).

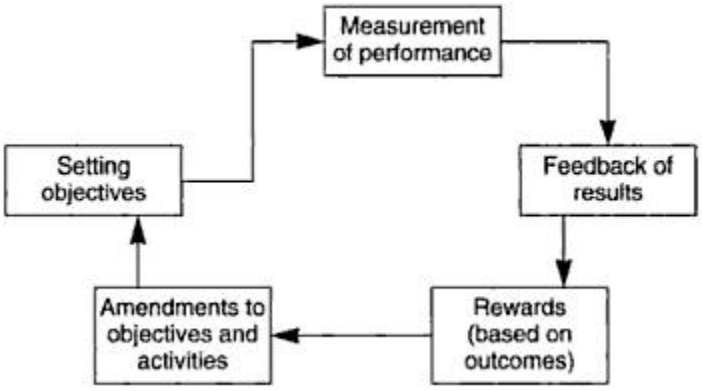


Figure 1: The Performance Management System Theory
Source: Aguinis H. (2009), "Performance Management (2nd Ed). Upper Saddle River, NJ: Pearson Pretence Hall

### 3.3 Wealth and Manufacturing Theory

Wealth may be categorized into two types; namely: natural prosperity and man-made wealth. Natural wealth is a derivative from unpolished resources, that is, resources happening in the natural state such as mineral deposits in the earth's crust and agricultural products. Natural wealth especially that based on mineral deposits is delectable.

Also, prosperity gotten from agrarian merchandises without artificial contributions is unmaintainable in contemporary times. Natural wealth is fate-dependent and its location can hardly be influenced by man. Proceeding the other indicator, artificial affluence is one derived from sophisticated or manmade products, in which man exercises huge control. This type of wealth is usually sustainable. In this case, the wealth usually is created by manufacturing (Hill, 2007).

Manufacturing is alarmed by the conception of belongings, where a good is a tangible entity and it is unquestionably one of the most important sectors of national economies, as it creates wealth. The tendency is most societies are to create more wealth. And the more volume of manufacturing activities, the more plentiful the wealth produced (Vollmann et al., 2000).

To Ibhadode (2006), manufacturing is a productive system that may be demarcated as a method for changing resource inputs into goods and waste products. The contributions to the system are energy, materials, equipment, labour, information and other capital-related inputs (infrastructure). The involvements are rehabilitated to outputs by the process technology, which is the particular method used to transform the various inputs into outputs. Changing the process technology alters the way one input is used in relation to the extra and the variation of output produced likely would be different.

The outputs produced include useful products (goods), and waste products. Waste production is inevitable as a significance of the comprehensive outcomes of the second rule of thermodynamics. It is characteristic of processes including human life that they take in suitable raw materials and convert them into products of value. In doing so, they must produce waste materials (Ibhadode, 2006). This is inevitable even under clean technology.

The process technology in an industrial system is usually affected by means of machines and equipment along with the processing methodology. The body of knowledge worried by the optimum amalgamation of machinery, materials, and methods necessary needs to attain cost-effective and easy production is referred to as manufacturing engineering (or manufacturing technology when castoff insecurely and interchangeably). It combines field experience and special engineering research with concepts of essential and applied sciences to solve basic and specific manufacturing problems.

Manufacturing technology techniques are of immense standing to contemporary businesses wherever unthinkable machineries are shaped after basic resources such as blanks using basic specific manufacturing processes. In aggregation through manufacturing administration techniques, it ensures the most effective use of materials and labour. It curtails wastes and ensures the use of the right processes for each operation in the production of a product or component. It also guarantees the greatest operative method of handling and assembly of components to form specific products (Ibhadode, 2006).

### 3.4 Manufacturing and National Economies

While innovation and rapid technological changes are the reasons for unprecedented prosperity and growth in industrialized countries, numerous emerging nations and countries with economies in transition are risking marginalization by being trapped in the technology-divide and investment gap. Research, growth and innovation-intensive products are increasingly driving world trade. According to a UNIDO report in 1998, high – and medium – technology products accounted for 63.6%. 67.8% and 53.8% of factory-made transfers of world developed economics and developing economies respectively. Regrettably they accounted for only 12.7% of manufactured exports from Sub-Sahara African countries. This poses grave industrialized and financial expansion challenges to the Sub-Saharan region (World Bank, 2008).

To prove further that manufacturing drives the economy, despite the endowment of large reserves of oil in the major oil producing countries, their GDP, per capita income, per capita value added in manufacturing and longevity are 3%, 14%, 7% and 28% respectively of those for the G7 countries. The contribution of manufacturing to the GDPs of the chief oil making republics is at about the equal neck and neck as for the creation's 20 lowliest nations (World Bank, 2008).

### 3.5 Manufacturing Sector in Nigeria

The Nigerian economy is in a precarious state. The industrial segment seems to be hardest hit. Whereas the callous influence of industrial to GDP in the world's 20 poorest countries was 9% in 2003 that of Nigeria was only 4%. Further, while the ecosphere's 20 humblest republics had a mean per capital value

added in manufacturing in 2003 of $22, Nigeria had only $16. The picture is even worse when Nigeria is paralleled by the 5 oil-producing nations (Ubeku, 2005). The Manufacturing association of Nigeria (MAN) has given the current status of the business sector in Nigeria and is summarizes as follows**:**

i. The contribution of manufacturing to the GDP has been on persistent decline so far over time declined from 8.2% in 1990 to 4.7% in 2003.
ii. At sovereignty in 1960, the contribution of the industrialized sector to GDP was 3.8%. Notwithstanding the growing contribution and dominance of the emollient segment since the 1970s, manufacturing recorded impressive performance and contributed on the average was consistently above the 70% mark. The situation has changed dramatically. Industrial capacity utilization dropped to a paltry 48.8% in 2003.

MAN gives the following as limitations to the manufacturing sector namely, sector is highly importing dependent, policy inconsistencies, multiple taxation, weak infrastructural base, ineffective public utilities, acute funding problems, weak capital base, high cost of fund, counterfeit products, substandard imported products, poor sales partly owing to low purchasing power of the citizenry and delay in clearing consignments due to presence of manifold inspection agencies at ports (World Bank, 2008).

## 4. Materials and Methods

The research design for this study included survey method, oral interview and model modification. The population was 745 with a derived sample size of 509 using Taro Yamani's statistical formula and four breweries were studied. Structured questionnaire and oral interview schedule were instruments used for data gathering.

The first hypothesis was tested using the Z test of population proportions while the second hypothesis was tested using the Spearman's ranking correlation coefficient (SRCC). The test-retest method and Spearman's ranking correlation with a coefficient of 0.9 or less than 1 or equal to 1 makes the research measure to be reliable. The decision rule was to discard the Ho and uphold Hi if the Z calculated value exceeds the critical or the Z-table values. But if the reverse is the case, null hypotheses is upheld.

## 5. Results and Discussions

### 5.1 Percentage Analysis

A five point Likert-scale was used with values assigned ranging from 5(SA) to 1(SD) for positive responses and vice versa for negative responses. Table 4.1 gives the breakdown of the responses connected with the two objectives.

Table 4.1: The breakdown with responses related to the two objectives

| S/N | STATEMENTS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|---|
| | | X | SA | A | U | D | SD |
| 1. | Capacity planning to a great degree enhances the economic show in the distilling sector in the studied area. | F<br>% | 300<br>40.541 | 367<br>49.595 | 23<br>3.108 | 25<br>3.378 | 25<br>3.388 |
| 2 | There is a momentous affirmative affiliation between capacity supplies design and materials necessities development | F<br>% | 304<br>41.081 | 370<br>50.000 | 22<br>2.973 | 23<br>3.108 | 21<br>2.838 |

Source: From the Questionnaire Administered

Table 4.1 shows the statements and the responses namely Strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D) and Strongly Disagreed (SD). For the statement that capacity planning to a great degree enhances the performance in the area sunder study in Nigeria, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 300, 367, 23, 25 and 25 out of 740 respectively. These gave percentages to 3 decimal places of 40.541, 49.595, 3.108, 3.378 and 3.378 respectively. For the statement that there is a substantial confident rapport between capacities supplies preparation and materials requirements planning, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 304, 370, 22, 23 and 21 out of 740 respectively. These gave percentages of 41.081, 50.000, 2.473, 3.108 and 2.838 respectively.

Table 4.2 gives the breakdown of the 12 steps towards developing a capacity plan that have positively affected profitability in the area studied.

Table 4.2: The breakdown of the 12 steps towards developing a capacity plan that have positively affected profitability in the area studied

| s/n | The 12 steps | Frequency | Percentages |
|---|---|---|---|
| 1 | To determine facility equal requirements | 69 | 9.624 |
| 2 | To define workloads | 66 | 8.919 |
| 3 | To regulate the element of labor | 65 | 8.784 |
| 4 | To determine the service levels of each workload | 64 | 8.649 |
| 5 | To analyze the present scheme volume | 63 | 8.514 |
| 6 | To quantify facility heights | 62 | 8.378 |
| 7 | To measure the general supply practice | 61 | 8.243 |
| 8 | To measure the supply practice by load | 60 | 8.108 |
| 9 | To identify the constituents of reply period. | 59 | 7.973 |
| 10 | To plan for the future | 58 | 7.838 |
| 11 | To determine the upcoming dispensation supplies | 57 | 7.703 |
| 12 | To plan the upcoming scheme arrangement | 56 | 7.568 |
| | **Total** | **740** | **100** |

Source: The 12 steps and the numbers are got from the questionnaires administered

From Table 4.2, the 12 steps were to regulate facility equal requirements, to define workloads, to regulate the component of work, to determine the service levels of each workload, to analyze the current system capacity, to measure service levels, to measure the overall resource usage, to measure the reserve practice in workload, to identify the components of the response time, to plan for the future, to determine the future processing requirements and to plan the future system configuration. They had frequencies of 69, 66, 65, 64, 63, 62, 61, 60, 59, 58, 57 and 56 out of 740 respectively. These gave percentages of 9.324, 8.919, 8.784, 8.649, 8.514, 8.378, 8.243, 8.108, 7.973, 7.838, 7.703 and 7.568 respectively.

### 5.2 Relative Frequency Analysis

Table 4.3 shows the breakdown of the responses opposite in meaning to the objectives.

Table 4.3: The breakdown of the responses opposite in meaning to the two objectives

| | **STATEMENTS** | **RESPONSES** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **X** | **SA** | **A** | **U** | **D** | **SD** |
| 1. | Capacity planning to a little extent enhances the presentation in the distilling sector under study | F<br>R.F | 25<br>0.034 | 25<br>0.034 | 23<br>0.031 | 367<br>0.496 | 300<br>0.405 |
| 2 | There is a substantial adverse bond amid capacity supplies planning and resources supplies preparation | F<br>R.F | 21<br>0.028 | 23<br>0.031 | 22<br>0.030 | 370<br>0.500 | 304<br>0.411 |

Source: Statements, responses and the numbers are got from the questionnaire administered

Table 4.3 shows the statements, the reactions, numbers and the relative frequencies which summed up to 1. For the statement that capacity planning to an appreciable extent enhance the economic performance in the distilling sector under study, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 25, 25, 23, 367 and 300 out of 740 respectively. These gave relative frequencies of 0.034, 0.034, 0.031, 0.496 and 0.405 respectively.

For the statement that there is a substantial adverse association between capacity supplies planning and materials supplies preparation, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 21, 23, 22, 370 and 304 out of 740 respectively. These gave relative frequencies of 0.028, 0.031, 0.30, 0.500 and 0.411 respectively.

### 5.3 Analysis using the Factor of Variation

Table 4.4 shows the breakdown of the other responses connected to the two objectives.

Table 4.4: The breakdown of the other responses connected to the two objectives

| S/n | Statements | X | SA | A | U | D | SD | $\overline{X}$ | S | $\frac{\overline{X}}{S}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Adding capacity in expectation of an increase in demand increases the performance in the distilling sector under study. | F | 298 | 366 | 24 | 26 | 26 | 4.195 | 0.925 | 4.535 |
| 2 | Adding volume afterward the business is operating at full capacity due to increase in demand increases the performance in the distilling sector under study. | F | 26 | 26 | 24 | 366 | 298 | 1.805 | 0.962 | 1.979 |
| 3 | There is no association between capacity requirements preparation and materials requirements planning | F | 20 | 22 | 21 | 371 | 306 | 1.755 | 0.863 | 2.039 |
| 4 | Materials requirements planning has an optimistic relationship with capacity requirements planning. | F | 306 | 371 | 21 | 22 | 20 | 4.244 | 0.863 | 4.918 |

Source: From Questionnaire Administered

Table 4.4 gives the statements, responses, sample mean, standard deviation and coefficient of determination. For the statement that adding capacity in expectation of an increase in demand increases the performance in the distilling sector studied Nigeria, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 298, 366, 24, 26 and 26 out of 740 respectively. These gave a sample mean of 4.195, standard deviation of 0.925 and coefficient of variation of 4.535.

For the statement that adding capacity Adding volume afterward the business is operating at full capacity due to increase in demand increases the performance in the distilling sector under study Nigeria, the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 26, 26, 24, 366 and 298 out of 740 respectively. These gave a sample mean of 1.805, standard deviation of 0.962 and a coefficient of determination of 1.979.

For the statement that there is no association between capacity requirements preparation and materials requirements planning the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 20, 22, 21, 371 and 306 out of 740 respectively. These gave a sample mean of 1.755, standard deviation of 0.863 and a coefficient of variation of 2.039.

For the statement that Materials requirements planning has an optimistic relationship with capacity requirements planning the responses were Strongly Agreed, Agreed, Undecided, Disagreed and Strongly Disagreed. They had frequencies of 306, 371, 21, 22, and 20. These gave a sample mean of 4.244, variance of 0.863 and a coefficient of variation of 4.918.

In all the positive statements it had a higher sample mean, and higher coefficient of variation than the corresponding negative statements. In all the negative statements it had lesser sample mean with lower coefficient of determination than the corresponding positive statements. A good number out of the 740 respondents approved the positive statements.

**5.4 Hypotheses Testing**

Table 4.5: Computational details of first hypothesis

| Hypothesis number | Calculated Z value | Table Z value | Statistical Decision |
|---|---|---|---|
| 1 | 6.893 | 1.645 | Reject Ho |

$$Z = \frac{\frac{X}{n} - P_O}{\sqrt{\frac{(P_O(1-P_O))}{n}}}$$

$$Z = \frac{\frac{667}{740} - 0.8}{\frac{(0.8)(1-0.8)}{\sqrt{740}}}$$

$$Z = \frac{\left(\sqrt{740}\right)(0.101351351)}{0.4}$$

$$Z = 6.892637062$$

$Z = 6.893$ to 3 decimal places

Source: Respondents that strongly agree or agree with the declaration *x* is got from the questionnaires administered, *n* = 740, *Po*, the prescribed proportion is 0.8 and the rest are calculated.

From Table 4.5, it is shown that the calculated Z value which is 6.893 is superior to the table Z value which is 1.645. So null hypothesis is disallowed and the alternative is upheld. So capacity planning to a

great degree improved the economic performance in the distilling industry in Nigeria. Table 4.6 shows the computational details of the second hypothesis.

Table 4.6: Computational details of second hypothesis

| Year | Rise in capacity requirements planning | Rank | Rise in materials requirements planning | Rank | d | $d^2$ |
|---|---|---|---|---|---|---|
| 1 | 5 | 10 | 4.5 | 9 | 1 | 1 |
| 2 | 4 | 7.5 | 4 | 7.5 | 0 | 0 |
| 3 | 3 | 5.5 | 3 | 5.5 | 0 | 0 |
| 4 | 2 | 2.5 | 2 | 2.5 | 0 | 0 |
| 5 | 2 | 2.5 | 2 | 2.5 | 0 | 0 |
| | | | | | | 1 |

$$r_s = 1 - \frac{6\sum d^2}{(n)(n-1)(n+1)}$$

$$r_s = 1 - \frac{(6)(1)}{(5)(4)(6)}$$

$$r_s = 1 - \frac{1}{20} = \frac{20}{20} - \frac{01}{20} = \frac{19}{20}$$

$$r_s = 0.95$$

Source: The rises in capacity requirements planning and materials requirement planning are got from the questionnaires administered

From Table 4.6, the coefficient of correlation (Spearman's Rank) is 0.95 which is very close to 1, so the null hypothesis is overruled and the alternative hypothesis is upheld. So there is a substantial optimistic association between capacity and materials requirements planning.

Tale 4.7: The breakdown of the data on how indigenous capacity building theory relates to the two objectives

| S/N | STATEMENT | RESPONSES | | | | | $\overline{X}$ | Z |
|---|---|---|---|---|---|---|---|---|
| | | SA | A | U | D | SD | | |
| 1 | The indigenous capacity building theory has a optimistic association with the degree to which capacity planning enhances the performance in the distilling industry in the areas studied | 501 | 172 | 27 | 21 | 20 | 4.508 | 7.444 |
| 2 | The indigenous capacity building theory has a affirmative association with the nature of association between the capacity requirements and materials requirements planning. | 502 | 75 | 23 | 21 | 19 | 4.678 | 7.812 |

## 6. Discussion of Findings

It was established there was a positive association between the indigenous capacity building theory and the degree to which capacity planning improves the economic performance in the distilling industry studied in Nigeria. The mean of 4.508 was superior to three. So the mean is in strong agreement with the Likert scale continuum. The calculated Z value is 7.444 which is bigger than the Table Z value at a confidence level of 95%. This was an indication in acceptability with respondents who strongly agreed with the statement.

For organizations, most components of the work relates with capacity building: better governance, management, operational strategy, (including HRM, Finance and legal matters), package expansion and application, revenue base, trusts, and alliance, assessment, support, advertising, standing and planning, etc. For persons, there is a relationship of capacity building in areas of governance improvement, sponsorship talents, exercise/talking aptitudes, practical and establishing abilities including development which could be particular and specialized. Thus, capacity building is the basics that offer variability, elasticity and functionality of a program/organization to adjust to altering essentials of the targeted populace (Uyimmadu, 2008).

It was established that indigenous capacity building theory has an affirmative association with the flora of the association between capacity and materials requirements planning. 4.668 was the resultant sample mean. This shows that this mean score is in the strongly agree Likert scale continuum. The calculated Z

value is 7.812 which was superior to the table Z value at a confidence level of 95% which is 1.645. This revealed a congruence with a good number of respondents who intensely agreed with the declaration.

MRP (Materials Requirement Planning) systems do not perform capacity planning, but they can make it easier to plan and stay within the productive capacity. Using the MRP system, a manager can select key productive units, such as the component facility for KBC, and have the computer printout a "load projection" for that unit. This is done by examining orders that are currently in production or planned. The result is a summary of futuristic activity of the productive unit that allows the manager to look forward in planning the capacity. Capacity is "planned" by scheduling overtime, extra shifts, or subcontracting (Uwubanmwen, 2012).

For the purpose of the concise and focus discussion, Table 4.4 will be relevant. 300 out of the 740 respondents making 40.501% of them strongly agreed while 367 of them making 49.595% of them agreed that capacity planning to a great degree enhances the economic performance in the distilling industry the areas studied in Nigeria. The extent of agreement in this statement is also shown in which the mean score is 4.239 which exceeds the cutoff point of 3.00, and this is in agreement with the contention of Ubeku (2005) that says that brewing companies in general and brewing companies in particular take the issue of bulk development and economic performance as very important.

This is because without capacity planning, they will have difficulties in determining the production capacity of their facilities in terms of the contributions, produces and output and performance in relation to the degree they achieve or achieving their organizational objectives. No wonder Davis and Mabert (2000) have observed that in brewing organizations, many important capacity planning decisions are made in production planning activities. These decisions make the production planners to know when and with what resources organizations produce their outputs optimally.

The finding that 91 out of 100 respondents said that capacity supplies preparation had a progressive association with materials supplies development had some implications, the mean value was got as 4.234 which was greater than 3.00. This meant that as the determination of the volume needs of the distilling organization increases, the determination of the materials needs increases. This is because as Vollmann, et al. (2000) have observed, that requirements in capacity planning utilizes the time-phased material plan information produced by the requirements in materials planning system.

So, capacity needs time to utilize and determine the material's needs and when and how they should appropriate effectively. This includes the consideration of all actual lot sizes and lead times of when there are calls for resources and at what time the materials are received. It includes balancing the open shop orders, schedules and their receipts. If this is not properly carried out, together materials and capacity may not be sufficient once they are required. This might give rooms to interruptions in production that may warrant customer criticisms and loss of goodwill (Arnold, Chapman and Clive 2011).This finding agrees with the argument of NNPC (2000) that planning capacity requirements utilized time phased materials plan information produced by the materials requirements plan.

## 7. Conclusion

The finding that planning capacity improved performance economically in the distilling industry in the areas studied in Nigeria inferred that it made the distilling companies studied to achieve their objectives and goals as organizations. It also made them to shield the promises the companies made to their numerous stakeholders. The discovery that there was a substantial affirmative association between capacity and materials requirements planning respectively understood that there was an affirmative correspondence among them. This meant that planning materials requirements which a unique technique of harmonizing the complete invention tactics will apparently bring about an improvement of planning capacity requirements while taking future decisions on the items needed for creation competency of the distilling facility.

## 8. Policy Recommendations

It is endorsed that the strategic and production managers of the distilling companies studied should be backed by these policies:

i. The application of planning capacity as a technique to improve all performance factors.
ii. Application of the gains in correlation of capacity and planning materials requirements in manufacturing concerns.
iii. Applying the 12 steps of planning capacity for proper functioning and a successful business achievement.

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