

Industrial Facilities Arrangement and Economic Productivity/Performance in Nigerian Bottling Company Plc (Coca-Cola), Ilorin Nigeria

Ojo Oyetunde Olumuyiwa & Oyedele K. S.

Department Of Management And Accounting, Ladoke Akintola University Of Technology.

Abstract: *The promotion and improvement in the facilities arrangement and economic productivity/performance of an organization are the sine qua non for its strength of character, resilience, competitive ability, flexibility and profit maximization. The extent to which this is achieved in a typical manufacturing plant is what the study has set out to measure. This paper which is an exercise in manufacturing management takes a cursory look into the synergy between the arrangement of industrial facilities within an industrial layout and economic productivity/performance. It is a performance appraisal/ evaluation of how the placement of materials, machine and men has aided production. The paper examines the role that the optimum placement of equipment, machine, materials, and man power plays at reduction in the cost of production/distribution and ensuring maximum productivity. The Nigerian Bottling Company (NBC) Coca Cola Ilorin has been chosen for the research being a typical manufacturing establishment which arrangement of industrial facilities ideally involves allocation of space and arrangement of equipments. Furthermore, it is one of the few multinationals with longevity in terms of life span in Nigeria having been incorporated since 1951. The methodology of the research is of both primary and secondary sources of data gathering. The researcher became a participant observer in the plant for a period of three weeks. For the primary source, there was the administration of questionnaire on the management and staff with the main aim of gathering information on how the arrangement of the facilities within their industrial layout has contributed to their effective performance, thus enhancing economic productivity. The secondary source which are mainly books, journals, magazines, newspapers and the internet would complement the primary effort. Data collected were analyzed using percentage analysis and hypothesis tested through Z score statistics at 0.5% significance. The result of the findings is expected to be of tremendous help to corporate management policy makers and other stake holders in the manufacturing industry particularly those with challenges on the arrangement of facilities and allocation of time and space. It is also a consultancy report or feasibility study for industrialists and entrepreneurs venturing into manufacturing of soft drinks.*

Key Words: (1) Industrial Facilities Arrangement (2) Economic Productivity/Performance (3) Nigerian Bottling Company (Coca Cola) (4) Ilorin (5) Nigeria

I. Introduction

Background to the Study

One of the daunting challenges confronting the management of manufacturing establishments is that of arranging industrial facilities within an industrial layout. This is because the arrangement is not a short term measure; but rather a long time commitment upon which the efficiency of production depends. If it is fundamentally wrong, it can mar the future of such an establishment. Facilities Arrangements are phenomena that cannot be subjected to laboratory palaver of experimentation in which several possible hunches/hypotheses can be tested with the aim of validating or invalidating them. Hence, it is not an issue of which correction can later be effected; management just have to get it right from the outset. Thus, while trying to find optimal solutions to layout challenges, management is usually guided by two cardinal objectives. These are the minimization of the total distance travelled and its associated cost and the creation of production system that can meet the capacity of the firm and maximize operational efficiency of the layout design. This goes a long way in the determination of a firm's job related actions and their outcomes within a particular position or setting (Telsany, 2008).

In essence, the focus on how industrial facilities are arranged would be the key feature of a conversion process which is the efficiency with which the products are transferred to the final consumers. This physical location or spatial arrangement of the organisations' resources like equipments, work centres, offices, conveyor belts and even the canteen and medical centres among others would guarantee a lot of interdependent movements between and within departments. Consequently, this may require the service of full time work layout consultants who are technical experts, usually with work study

background, and other experienced personnel drawn from various departments such as electrical, engineering, plumbing, maintenance and safety as well as from the production line. This layout collaborative network would allocate the space in a new factory and then re-plan in order to accommodate expansion and contractions. Their main task is how to translate the wishes and requirements of production management to suit the actual availability of space and services such as water, electricity, gas, drainage, lighting, ventilation, safety and other regulations. (Imanga, 2003).

In other words, depending on the nature and character of the industry, facilities arrangement can begin with plant layout planning. This is a floor plan for determining and arranging the desired machinery and equipments, whether established or contemplated in the best place. This will also permit the quickest flow of material at the lowest cost and enhance efficiency within the building/ structure for the specific purpose. Also, it will guarantee the least amount of handling in processing the product from the receipt of the raw material to the shipment of finished products. It is also required that departments and work centres that have a lot of interaction between them be placed as close as possible to each other to facilitate easy contact and minimize the distance and cost of distance travelled. This in technical parlance is known as the Principle of Minimum Distance (Shrooeder, 1993).

Furthermore, there are other corollaries that are associated with this Principle of Minimum Distance which makes it imperative for management to get it right as from the beginning. One of them is the Principle of Flow. This contends that other factors being equal, the best plant layouts are the ones which result in smooth and continuous flow of work as per sequence of operation. The moment this is done, it will guide against any back-tracking, cross movements, interruption or delays in the movements of work, men and material. All these hindrances, obstruction and impediments would not arise the moment there is regard for the sanctity of Cubic Space Utilization (Wikipedia, 2010).

Moreover, the implementation of world class manufacturing practises requires organising for quick product flow and tight process – to – process and person to person linkages. The network of relatively autonomous operating units in the manufacturing plant's organisational structure should be dynamic enough for each unit or module to perform a specific process or task. The different modules like a symphony would interact in harmony to provide mass-produced products (Grant et al 1991). In today's increasingly competitive environment, industrialists are under constant pressure to not only fashion out effective plant layout and efficient facilities arrangement, but also to ramp up production of them with minimum time to market, predictable cost and required quality. Enhancing facilities arrangement is essential at addressing challenging cost, time and quality targets (Owens, 2000).

Nevertheless, whereas the focus of many engineering –centric process is on 'what' product to produce, facilities arrangement defines how a product is to be produced, the process of the production and the channels the production processes will pass through. It receives the digital product definition from engineering, considers the capabilities and capacities of internal plants and external suppliers, and delivers/influence the set of manufacturing plans required to produce the product. In other words, all these are encapsulated in the Principle of Cubic Space utilization which contends that the good layout should also include the utilization of both the horizontal and vertical spaces. It is not only enough if only the floor space is utilized optimally without consideration for the height dimension (Wikipedia2010).

Furthermore, it is apt to note that in the production process is also a third system sometimes known as 'island services'. This is a system of supports running in several parallel lines at interval across the floor. To these supports are attached the gas, air and electrical services so that the machine positioned along these runs can be tapped into the lines in the main factory plant. The non essential support equipments that do not need to be isolated such as steam generator, vacuum pumps and heating/cooling skids may be placed outside of the control system. Suffice it to note that the Arrangement of Facilities should be in strict compliance with the Principle of Integration. This asserts that a well arranged industrial facilities are the ones that integrate men, materials, machines and other supporting services in order to achieve optimum resource utilization and maximum effectiveness. In essence, the actualisation of the Principle of Integration also goes along with the accomplishment of its Siamese twin which is the Principle of Minimum Handling. An ideal layout is such that would reduce the material handling to the barest minimum. This is to ensure quality control and prevent the end product from being dented, reshaped or being a radical departure from original projection (Kurmar, 2009).

Also, a major factor when siting industrial layout is the necessity or imperativeness for large space that can permit further alteration, expansion, adjustment and manoeuvrability without much cost and damage to facilities, materials, men and time. The moment the entire industrial layout avails itself of opportunity of vast space, it then becomes a factor which each unit, department or centre can utilise. This is because the equipments are arranged in an operational sequence with components and assemblies flowing into the main assembly line at the correct position Out of the abundance of the space, the

departments thrive and dwell. This in manufacturing management is technically referred to as the Principle of Maximum Flexibility (Speeding, 2006).

Finally, due regards and consideration should be given to workers safety, security and satisfaction. This Principle would safeguard the plant, machinery, raw materials and finished products against fire, theft, corrosion and other destructive or deleterious challenges. The layout can then be drawn or sketched as the proto before the plant is put into effect and operation. The overall objective is to design a physical arrangement that would meet the required output quality in the most economical manner. The primary objective is the maximization of profit through the arrangement of facilities to the best advantage of aggregate total manufacturing of the product (Nwachukwu, and Nwachukwu, 2002).

1.2 Research Objectives

The study attempts to examine the functional linkages between the facilities arrangement in an industrial layout and economic productivity focusing on the Nigeria Bottling Company (NBC) popularly called Coca Cola. The Ilorin plant has been chosen for study.

- I. Specifically, the study shall pursue the following objectives
- II. To identify the nature and character of facilities arrangement of NBC, Ilorin
- III. To evaluate how facilities arrangement has aided or hampered staff performance.
- IV. To find out the impact of facilities arrangement on the economic productivity of NBC.
- V. To discover the level of awareness of NBC Staff of the role facilities arrangement play in enhancing their productivity.

Apart from the section that introduces the paper, Section Two discusses literature review and conceptual clarifications while section Three describes the methodology. Section Four presents the data and the result discussion with section Five concluding the work.

Conceptual Clarification And Literature Review

The two concepts that are central to this research are facilities arrangement and economic productivity/performance. In essence, industrial facilities arrangement would depict the layout or the arrangement of various industrial equipments, gadgets, machines, materials, manpower and the supportive services of the industry that would enable optimal factory production. It is the organized placement of buildings, structures, plants and machineries for the production of goods and services.

According to Mumford (1991), 'this is a plan of an optimum arrangement of facilities including personnel, operating equipments and all other supportive services. In other words, Mumford position is that it is an organic process integrating both the manufacturing and the extra manufacturing as in the transport unit, administrative unit and welfare within a complex design of best structures so that the aims and objectives propelling the establishment of such an organization can be achieved.

The position of some authors is the contention that the choice of layout design is to a large measure, determined by the nature of the product or the production process. In this category are Kurmar (2009), Alao (2010) and Press et al (1994). Specifically, they categorized physical layout designs into three which are the product layout, the process layout and the fixed position layout. In the product or line layout, machines are arranged in one line or grouped in one sequence depending upon the sequence of operations required for the product. The materials then move from one work station to another sequentially without any back tracking or deviation. Therefore as raw materials are fed into the first machine which through conversion process become finished goods which travel automatically from machine to machine, it is apt to note that the output of one machine becomes the input of the other. For example, in a paper mill factory, wood or bamboo may be fed into machine at one end and becomes pulp at the next machine which may bring paper out at the other end. While these authors have outlined these technicalities, they have not actually delved into how the various processes have enhanced productivity or led to efficiency in performance.

Furthermore, in process layout, the arrangements of machines are dictated by processes whereby machines of a similar type are arranged together. For example, if there are machines performing drilling operations, they are to be arranged together in the drilling departments while machines performing casting operations are to be grouped together in the casting department. Hence, such layouts typically may have drilling departments, milling departments, welding departments, heating department and painting departments just to mention few. Suffice it to note that this process or functional layout has its origin in the ancient or historical handicraft method of production. The work has to be allocated to each department in such a way that no machine is chosen to do as many different jobs as possible. In other words, the emphasis is to discourage the installation of general purpose machines. The work which has to

be done is allocated to the machines according to loading schedules with the objective of ensuring that each machine is fully loaded (Soba, 2005) (Shroeder, 2003) (Monks, 1996).

Also, for the fixed position layout, the major product being produced is fixed at one location. Equipments, labour and components are then moved to that location. All facilities are brought and arranged around one work centre (Afolabi, 2008) (Delbridge, 1998) (Akinlo, 1996). However, there are some manufacturing plants that may require a combination of some of these layouts. The essence of all these typicalities is the arrangement on a functional basis. However, the focus of all these is on the technicalities of machine arrangement without dwelling on its functional linkage to productivity.

On the other hand, this paper will be incomplete without reference to economic productivity/performance. This is even the major crux of this research exercise. Seitz (2002:211) and Ndiyo (2003:848) contend that the ultimate impact of technological development is the enhancement of the wellbeing and influence of man through the creation of wealth. According to them, technology makes economic growth and social change happen. The limited use of high technology in the developing countries is one of the reasons they are less developed and less prosperous than the industrialised nation. Economic productivity however, is an embodiment of several variables which ultimately influence and determine social welfare. Therefore, the multi dimensional nature of economic development is what has made it difficult for a single definition to succinctly capture it. Nevertheless, it is related to increase in the level of output or rise in the per capita income of a country in a given period of time (Adeola, 2005).

However, performance evaluation is the cumulative consideration of factors that may be representative indicators or appraisal of an individual or entity's activity, or performance in reference to some standards over a period of time. It considers the degree of goal attainment, how items are measured and what standards are to be applied. It connotes an idea of assessment of management's results, which involves first determining whether or not there is an added value by outperforming the established bench mark and second, by determining how management has achieved the calculated return. In financial economics, its objectives is to assess the extent to which individuals add wealth to the firm and or its clients/ customers and to ensure that his or her achievement is above the market or industry norms, also called performance measurement.

In essence, the teleology of productivity assessment and the evaluation of performance indicators is on the imperativeness of embracing sustainable economic advancement, as well as improvement in the socio-political life and the general living standard of a nation over a period of time. According to the World Bank Development Report (2002 and UNDP 2011), the essential components of economic development should raise standards of living, improve education, health and even/equality of opportunities. There should be the reduction or elimination of poverty, inequality, illiteracy, corruption and unemployment. Furthermore, a society that cherishes economic development must develop viable, sustainable and functional infrastructural facilities like constant power supply, accessible roads, medical facilities, and efficient communication services among several others. All these would not be achievable without massive investment in scientific research relevant to the challenges of such countries. Also, the presence of a stable political environment and efficient security of life and property are essential ingredients of economic development.

A new dimension which Odejimi (2005) introduced into the concept of development is the auto centric phenomenon. This implies that the chronic dependence of one nation on another is not only incompatible with self dignity and self respect but also grossly incompatible with economic development. Hence, while highlighting economic factors/developmental indices like enhanced (real) per capital income and higher employment rate, she laid emphasis on local sourcing of raw materials and the development of local (industrial) technology. It is only when a society fulfils this requirement that development can really be said to be sustainable.

In similar veins, the position of Eshafani (2006) is to equate industrialization with economic development. This is because industrialization is a pre-requisite for economic development as the history of advance countries has indicated. For there to be development, the share of the industrial sector should rise and that of the agricultural sector declines. This would result in the benefits of industrialization trickling down to the other sectors of the economy in the form of the development of agricultural and service sectors leading to rise in employment, output and income. Jhingan (2002) (2008) goes ahead to operationally define industrialization as the process of manufacturing consumer goods and capital goods and of creating social overhead capital in order to provide goods and services to both individuals and businesses.

Nevertheless, developmental economists like Jhingan(2002) Olofin(2004) Falokun and Chete(2004) Obioma(2004) Essien(2005) Lall(2002) have done quite so much in identifying the various indices of development and have even advanced prescriptions and recommendations for hitherto backward societies that decide to leap frog from their economic backwaters, and join the elite league of

advanced countries. However, the functional linkage between facilities arrangement and economic development has not been their focus. The linkage is that facilities arrangement which is the configuration of departments, work centres and equipment in the conversion process, will streamline the flow of materials through the plant. There will be minimal material handling, reduction of wastage in time and material and the enhancement of high turnover in process inventory.

Oyelakin-Oyelaran (1997) Ogbu (2012) Venables (1996) Szirman (2005) Adiele (2002) and UN Brundtland Report (2008) contend that the concept productivity which has become a catchword in the industrial field, is a measure of the means of the economic soundness of the means of production. Economic productivity can then be perceived as the sum of the effort by all economic agents operating within an organizational and institutional set of arrangement that defines the economic system; tending to convert the resources available to the economy-labour, capital, entrepreneur and materials into output (goods and services) required by the society. In a world of scarce resources, growth and the welfare of society are associated with a long term improvement in productivity. Improvement in productivity often raise the standard of living by inter alia, allowing economies to compete effectively in the international division of labour and the exploitation of comparative cost advantage through commerce (Bankole and Bankole, 2004)

A review of this assertion may prove that improvement in the productivity would raise the standard of living, but allowing economies to compete effectively in the international division of labour and the exploitation of comparative cost advantage through commerce has not proved so. This is because of the growing asymmetries between the advanced capitalist countries and Third world societies. The relationship has been skewed in favour of advanced countries economies which are mainly of diversified/ industrialized commodities and Third world countries that are mono-economic and agrarian based. The position envisaged by Oyelakin-Oyelaran (1997), Venables (1996) and UN Brundtland would only arise when the two parties come to the international market as equals, but the disparity between them already renders the Third world society, a partner with a very weak bargaining ability (Salami, 2003). Moreover, the perspective the authors adopt is from a macro level which is at variance with the micro horizon of the topic. The analysis of the literature should focus generally on the productivity of manufacturing companies, with special emphasis on the introductory description of its economy, its salient features, the development path that has been followed in diversifying the economic base and the effects on the stakeholders: the staff, shareholders and the customers.

Furthermore, the dimension introduced by Ojo (1998) Fajana (2006) Iwara (2007) Fisher et al (2003) Otopo (2005) and Cole (2002) is that productivity analysis also occupies a central place in the study of wage problems and policies. A rise in wages backed up by a corresponding rise in productivity would contribute to over all gains not only for the economy but for the workers also. Nevertheless, wages/earnings cannot be linked to labour productivity alone without reference to capital productivity and the productivity of other factors. If gross margin declines, the rate of return on capital falls, provision for reserve goes down, the rate of profit is lowered and ultimately investment is slackened. In this reverse process, the rate of growth of industries begins to fall.

Finally, the position of Ray (2006) Tawiah (2001) Umoh (2002) Todaro and Smith (2009) is that productivity is one of the key determinants of cost and price which would ensure the level of competitiveness of the manufacturing industry. Transportation as well as the margin inputs such as raw materials, additives, power and other factors input go a long way in determining the Total Cost. This Total cost in essence is a function of the operating efficiency of the plant which can be evaluated by its capacity utilization and the economical use of major inputs such as the raw materials, factor inputs and power consumption per tonne of soft drink production. This production process becomes an identity which confers the ability of income generation on the establishment. It is then this ability of generating income that would enhance competitiveness. Competitiveness then is a factor determining whether a company breaks even, remains marginally afloat or goes completely bankrupt.

In a nutshell, Domar (2008) Anyawu and Oaikhenan (2009) Higgins (2006) Iyoha (2000) Kindleberger and Herich (2007) summarise all these positions by dwelling on how the distribution of productivity gains can be carried out and how to measure such gains. According to them, it is a function of the price system. It is like distribution of the first fruits of production among all the interested parties. The magnitude of the change in income distribution becomes directly proportional to the changes in price of productivity ratio. Productivity ratio implies the quantity of output produced by one unit of input in a unit of time. The productivity gains are then distributed for example to customers as lower product sales prices, the suppliers, continuous patronage, the immediate community, Corporate Social Responsibility(CSR) and the government, ability to pay taxes. While these authors have dealt extensively with the concept of productivity, linking it up with facilities arrangement has not really been their focus. This is the lacuna which this research intends to fill.

II. Methodology

The study attempted to examine how the arrangement of facilities within the Industrial Layout Plan of NBC has aided performance or productivity of the Staff.

Survey research was adopted through administration of structured questionnaire to elicit information about how the placement of men, machines and materials has facilitated the efficient and effective productive activities.

The entire staff strength of NBC, Ilorin plant is 520 (NBC, Ilorin information Desk) as at January 2012.

Since the questionnaire was personally administered with the aid of four research assistants for two weeks, the return rate was 93% which implies that out of 503 questionnaire that was administered, we were able to recover 467. The remaining 17 members of staff were not available for the administration of the questionnaire. The 467 questionnaires were carefully analyzed in terms of personal data of the respondents and the answers to the research questions. The questionnaire was structured in a rating order of Strongly Agreed, Agreed, Do not Know, Disagreed and Strongly Disagreed.

Mean Score was used to analyse the observation of the respondent on the questions while Z- Score statistics was used to test the hypothesis.

Mean Score is completed as the average response per each variable and the observation with the highest Mean score ranks first while others follow.

Mathematically, Z-Score Statistics is computed as : $\frac{\bar{x} - N}{Sdx}$

$$\frac{\bar{x} - N}{Sdx}$$

Where \bar{x} = Sample Mean

N = Population Mean

Sdx = Standard error of the mean calculated as standard deviation divided by root of sample size (Spiegel and Stephens, 2008)

Data Analysis

Table 1: Knowledge about Facilities Arrangement – (FA) Question 6

Response	Frequency	Percentage
Yes	387	83%
No	61	13%
Undecided	19	4%
Total	467	100

This table indicates that 83% of the NBC Staff has knowledge of what facilities arrangement in an industrial layout plan should be.

Table 2: Awareness of the Relevance of Facilities Arrangement to Economic Productivity.

Awareness of the Relevance of Facilities Arrangement to Economic Productivity	Frequency	Percentage
Very Relevant	140	30%
Relevant	280	60%
Irrelevant	35	7.5%
Very Irrelevant	0	0
Do not Know	12	2.5%
Total	467	100

90% of the respondents are aware of how relevant Facilities Arrangement can be to Economic Productivity.

Table 3: The Correlation between Facilities Arrangement and Economic Productivity

Response	Frequency	Percentage
STRONGLY AGREED	117	25%
AGREED	315	68%
DISAGREED	12	2.5%
STRONGLY DISAGREED	8	1.67%
DO NOT KNOW	15	3.3%
TOTAL	467	100%

93% of NBC believes that Facilities Arrangement enhances and aid Economic Productivity; 2.5 +1.67 =4.17 did not believe that facilities arrangement is an aid too economic productivity. 3.3% do not know. Table 3 which set out to measure the correlation of Facilities Arrangement and Economic

Productivity is the nerve centre of the research. This has been proved with the number 117 respondents that Strongly Agreed and the 315 that Agreed (117+315) = 432 respondents

Table 4: NBC has given due attention to time, space material and men in its facilities layout plan.

Response	Frequency	Percentage
STRONGLY AGREED	187	40%
AGREED	234	50%
DISAGREED	12	2.5%
STRONGLY DISAGREED	23	5%
DO NOT KNOW	12	2.5%
TOTAL	467	100%

90% of the NBC staff Agreed that due regard has been paid to the allocation of space, men, time and materials in the facilities layout plan of NBC

Table 5: Need for improvement in the Facilities Arrangement in the layout plan of NBC, Ilorin

RESPONSE	FREQUENCY	PERCENTAGE
STRONGLY AGREED	140	30%
AGREED	210	45%
DISAGREED	93	20%
STRONGLY DISAGREED	0	0
DO NOT KNOW	237	5%
TOTAL	467	100

This Table 5 above indicates that 75% of the respondents (staff) agreed that the existing facilities arrangement can be improved upon to enhance greater economic productivity.

Test of Hypothesis

Ho: There is no significant relationship between the Facilities Arrangement and Economic Productivity in Nigeria Bottling Company (Ilorin)

Testing the overall significance of Z- Score implies testing the Null hypothesis Ho against the alternative hypothesis Hi. If the Null hypothesis is true i.e the zones and the sample means do no lie within the population means at 0.05 significance level, we accept the Null hypothesis i.e that there is no significant relationship between the dependent and independent variables. However, if it is otherwise, we will reject the Ho and accept Hi which is the alternative hypothesis. Results from the hypothesis tested using Question 3 as analysed in table 3 shows the following:

Sample mean $\bar{x} = 1.89$
 Standard Deviation (SD) = 0.39
 Standard Error of the Mean $Sd \bar{x} = 0.15$

Population Mean Ranges between 117 and 8

The Z Score calculated is 14.22

Z score Table value at 0.05 level of significance is 1.96 for a two tail test

Since the Z score calculated (14.22) is greater than Z score Table (1.96) we at 0.05 significance level rejects Ho and accept Hi

Therefore, the relationship between the dependent and independent variables is significant. We then reject the Null Hypothesis and accept the Alternate Hypothesis that there is significant relationship between Facilities Arrangement and Economic Productivity of NBC, Ilorin Plant.

The above analysis is presented in the table below

Sample Mean \bar{x}	1.89
Standard Deviation	0.39
Standard Error of the Mean $sd \bar{x}$	0.15
Z- score calculated Z_c	14.22
Z- score T- Value $Z_{t\alpha.05}$	1.96
Population mean μ	109
Decision	Reject Ho and accept Hi

Source: Researchers' Findings 2013

III. Discussion Of Results

This paper focuses on the functional linkage between the nature and character of the placement of men, materials, machine and space within an industrial layout otherwise known as Facilities Arrangements (FA) and Economic Productivity. The result from the Data Analysis and hypothesis tested indicates that Facilities Arrangements is a critical factor influencing or determining economic soundness

of the means of production. Table 3 with 93% Staff respondents contends that there is correlation between organisation/institutional placement patterns and productivity.

In other words, the imperativeness for the sanctity of proper layout plan as factor enhancing the input –output conversion process is a fait accompli in the Manufacturing industry. The fundamental issue of infrastructural alignment which the NBC layout plan has addressed is the reason behind the transformation of the economic productivity of the plant. This is because of its particular emphasis on mechanical innovation and human capital safety. The synergy between NBC facility arrangement and Economic productivity is occasioned by pricing and demand. Since the price is relatively competitive and modest, consumers require more products than potentially producible. Thus promoting the plant to operate at full capacity utilization. Consequently, the number of stakeholders who generate income from the plant has also expanded. For example, the dealers have expanded into categories of Small Strategic Depot (SSD), High Volume Depot (HVD), Very Important Partner/ Customer Distribution Partner (VIP/CDP) and Shop Card Customer (SCC).

The ingenuity of its organizational expertise has positioned the Facilities Layout to enhance interdepartmental harmony which reduces the rate of accidents. There is labour cost reduction which ultimately leads to reduction in cost per unit. External transport facility is also easily accessible. There is also an enhanced division of work across the supply chain in the different stages of production coupled with effective coordination mechanism which has led to capital accumulation through investment in broader perspective. Also, the increase in productivity is due to a squeeze in wastage of resources; narrower limits of irrational mechanical processes of production as well as an affective linkage between production and market.

IV. Conclusion

The efficiency of production in general and manufacturing in particular is a distillation of how well the various machines and production facilities/amenities are located in a plant. An ideal facility layout should provide the optimum relationship, symphony and harmony among the output, floor area and the manufacturing process. It is observed that an efficient arrangement of industrial facilities is such that aims at achieving various objectives like efficient utilization of available floor space, minimizing of cost, allowing flexibility of operation, the guarantee of employees comfortability and ensuring maximum productivity. Such arrangements should be conducive to health and safety of employees and should ensure free and efficient flow of men and materials. The future expansion and diversification may be considered while planning the arrangement of industrial facilities. All these requirements have been factored into the facility layout planning of the Nigerian Bottling Company, (Coca-cola) Ilorin and it has gone a long way in enhancing its productivity while at the same time minimizing cost.

References

- [1]. Adeola, F.A (2005). Productivity Performance in Developing Countries. A Case Study of Nigeria. United Nations Industrial Development Organization (UNIDO) Report.
- [2]. Adele, CJ (2002). Technology Development and Productivity Atlanta: Prince Media Group.
- [3]. Afolabi, A (2008). Repositioning the Nigerian Economy through Scientific and Technological Innovations. Africa: Journal of Contemporary Issues 6:1-8.
- [4]. Akinlo, E (1996). Improving the Performance of the Nigerian Manufacturing Subsector After Adjustment. Selected Issues and Social Proposals. Nigerian Journal of Economics and Social Studies Vol 38.
- [5]. Alao, R (2010). "Productivity in the Nigerian Manufacturing Sub Sector: An Error Correction Model (ECM)" European Journal of Economics, Finance and Administrative Sciences. ISSN 1450-2887 Issue 2.
- [6]. Anyawu, J.C and Oaikhenan, H (2009). Modern Economics. Onitsha: Joanee Educational Books.
- [7]. Bankole, A.S and Bankole M.A. (2004). "Industrial Trade and Export Promotion Policies and Revealed Comparative Advantage in Nigeria's Manufactured Export. In Garba Abdul-Ganiyu et al eds. Leading Issues in Macro Economic Management and Development Nigerian Economic Society (NES).
- [8]. Cole, G.A (2002). Personnel and Human Resource Management. London: Book Power.
- [9]. Delbridge, R& Lowe, J eds (1998). Manufacturing in Transition. London: Routledge.
- [10]. Domar, E (2008). Towards a Dynamic Economics. New York: Macmillan Press.
- [11]. Essien, A.E. (2005). "A Consistent Macro economic Framework for the Agriculture Sector under the Natural Economic Empowerment and Development Strategy (NEEDS)" Central Bank of Nigeria (CBN) Publication. "The Bulletin".
- [12]. Falekin, G and Chete, L (2004). Challenges of Industrialization in Nigeria: What are the sources of Industrial Growth? Paper Presented at the 45th Annual Conference of the Nigerian Economic Society.
- [13]. Falokun, G. and Chete, L. (2004). Challenges of Industrialization in Nigeria: What are the Sources of Industrial Growth? Paper Presented at the 45th Annual Conference of the Nigerian Economic Society.
- [14]. Fajana, S (2006). Industrial Relations in Nigeria: Theory and Features (3rd Ed.) Lagos: Lobofin & Co.
- [15]. Fisher, C.D. Schoenfeldt, L.F. and Shaw, J.B. (2003). Human Resource Management (5th Ed.) Boston: Houghton Mifflin Co.
- [16]. Forster, L. Haltiwanger, J and Syverson, C. (2008). "Reallocation, Firm Turnover and Efficiency Selection on Productivity or Profitability?" American Economic Review, 98 (1): 394-425.
- [17]. Eshafani, O (2006). Sector Properties and Growth in the Development of the Nigerian Economy. Pakistan Economic and Social Review, 3[7]:151,-168.

- [18]. Grant, R.M. Krishmen, A. Shamir, B and Baer, R (1991). *Appropriate Manufacturing Technology: A Strategic Approach*. Shean Management Review. Volume 33. No 1 pg43-54.
- [19]. Higgins, B (2006). *Economic Development Principles, Problems and Policies*. New Delhi: Indian University Press.
- [20]. Hill, T. (1985). *Manufacturing Strategy: The Strategic Management of the Manufacturing Function*. London: Macmillan Education Books.
- [21]. Imanga, E. (2003). *Theory and Practice of Production and Operations Management*. Enugu: Phyce Kirex.
- [22]. Iwara, E.I. (2007). *Industrial Relations in Complex Organization in Nigeria* in Bello-Imam, I.B. Oshionebo, B.O. and Ojeifo, S.A (eds) *Fundamentals of Human Resource Management in Nigeria*. Ibadan: College Press and Publishers.
- [23]. Iyoha, M.A (2000). "The Sources of Economic Growth," *The Nigerian Economics and Financial Review* Volume 5, Number 2, December 1-20.
- [24]. James, L. (1984). *Effective Industrial Management*. New Delhi: Eurasia Publishing House.
- [25]. Jhingan, M. (2002). *Advanced Economic Theory*. Delhi: Vrinda Publications.
- [26]. Jhingan, M.L (2008). *The Economics of Development and Planning* New Delhi: Vrinda Publication Ltd.
- [27]. Kindlberger, C.P and Herich, B (2007). *Economic Development*. New York: Mc Graw-Hill.
- [28]. Kumar, A. (2009). *Plant Location and Layout*. Palo Alto, California USA: New Age International Private Ltd.
- [29]. Lall, S. (2002). *Foreign Direct Investment and Development: Research Issues in Emerging Context in Foreign Direct Investment*. Biji, B ed London: Routledge.
- [30]. Monks, J. (1987). *Operations Management: Theories and Problems* Singapore: McGraw Hills.
- [31]. Mumsford, E. (1991). "Social Return from Research and Development: Findings, Methods and Limitations" *Research and Technology Management*. New York: Pergamon Publication.
- [32]. Ndiyo, N.A (2003). *Productivity and Technology Diffusion in Nigeria*. *South African Journal of Economic and Management Sciences*. 6(4): 848.
- [33]. Nwachukwu, G. And Nwachukwu, O. (2002). "The Place and Importance of Materials Management in Effective Development Projects, Cost Engineering and Management. *Inter-World Journal of Management and Development Studies* Vol. 1 December No. 1 p. 252.
- [34]. Obioma, E. (2004). *Industrialization and Economic Development. A Review of Major Conceptual and Theoretical issues*. Ibadan: NCEMA.
- [35]. Odejimi, D (2005). *Industrialization: A Key to Socio-economic Development in Nigeria*. *International Journal of Economic and Development Issues* Vol. 5 Nos 1 & 2. The Development Universal Consortia.
- [36]. Odejimi, D. (2005). *Industrialization: A Key to Socio-economic Development in Nigeria*. *International Journal of Economic and Development Issues*. Vol. 5. Nos. 1&2. The Development Universal Consortia.
- [37]. Ogbu, O. (2012). *Towards Inclusive Growth in Nigeria*. The Brookings Institution's Global Economy and Development Policy Paper No 2012- 03 June pp 1-7.
- [38]. Ojo, F. (1998). *Personnel Management: Theories and Issues*. Lagos: Panaf Publishers.
- [39]. Obioma, E. (2004). *Industrialization and Economic Development. A Review of Major Conceptual and Theoretical Issues*. Ibadan: NCEMA.
- [40]. Olofin, S. (2004). *Re-orienting Nigeria's Industrialization Strategy*. Presidential Address Delivered at the 45th Annual Conference of the Nigerian Economic Society.
- [41]. Otobo, D. (2005). *Industrial Relations Theory and Controversies*. Lagos: Malthouse Press.
- [42]. Owens, G (2000). *Cereals Processing Technology* Cambridge England: Woodhead.
- [43]. Oyelakin-Oyeleran, A. (1997). *Nnewi: An emergent Industrial Cluster in Nigeria*. Ibadan: Technopol Publishers.
- [44]. Oyeniran, R.S and Ajayi, T.M. (2007). *Introduction to Personnel and Industrial Relations*. Lagos: Busoforever Holdings.
- [45]. Press, K.L. Muhlemen, A. Oakland, J. (1994). *Production and Operations Management* London: Pitman Publishers.
- [46]. Ray, P. (2006). 'A Textbook of Economics'. London: Letts Educational Publisher.
- [47]. Seitz, J.L. (2002). *Global Issues- An Introduction (Second Edition)* Oxford: Blackwell.
- [48]. Shrooeder, R. (1993). *Operations Management: Decision Making in the Operations Functions*. New York: McGraw Hills.
- [49]. Soba, B. (2005). *Economic Development and the Challenges of Industrialization in Nigeria*. *International Journal of Economic and Development Issues* Vol. 5, Nos 1 & 2. The Development Universal Consortia.
- [50]. Speeding, A. (2006). *Facilities Management*. Bristol, United Kingdom: Taylor & Francis Publishers.
- [51]. Spiegel, M.R. and Stephens, L.J (2008). *Theory and Problems of Statistics*. Schawn Outline Series. New York: Mc Graw Hills.
- [52]. Szirmai, A. (2005). *The Dynamics of Socio- Economic Development*. New York: Cambridge University Press.
- [53]. Tawiah, P.F (2001) *Basic Economics* Benin City: Idodo Publisher.
- [54]. Todaro, M.P and Smith, S.C (2009). *Economic Development Tenth Edition*. England: Pearson Educational Limited.
- [55]. Telsany, M. (2008). *Industrial Engineering and Production Management*. New Delhi: S. Chand and Company Publishers.
- [56]. Umoh, J.U. (2002). *Economics: An African Perspective* Lagos: John West Publication.
- [57]. UN Brundtland Report (2008). *Romania on its way to a Sustainable Society*. Sustainable Society Foundation Retrieved from UNO (1996) *Key Elements of Sustainable Development in Third World*. Geneva: World Development Paper.
- [58]. UNDP (2011). *Human Development Reports*. New York: Macmillan Press.
- [59]. Venables, P.D (1996). *The Spread of Industrial Spatial agglomeration in Economic Development*. Centre for Economic Performance Discussion Paper.
- [60]. Wikipedia, (2010). *Facility Layout* www.co.wikipedia.org/wiki/facility-layout
- [61]. Wild, R. (1980). *Essentials of Production and Operations Management*. London: Rinehart and Winston.
- [62]. World Bank Development Report (2002). *Entering the 21st Century*. New York: Oxford.