



Second Edition

**Introduction *to*
Business
Organisation**

A BOOK OF READINGS

Edited by

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Chapter 19

Production Function in Business Organisation

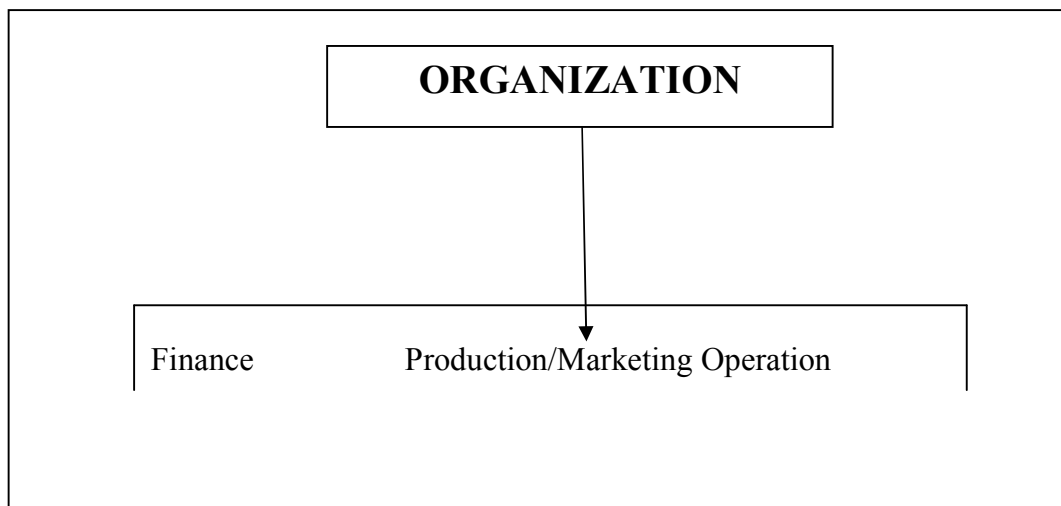
By

A.R. Hassan, Ph.D, and O.C. Jongbo

Introduction

Production is the transformation of raw materials into finished goods as desired by man. It often goes with operations management because it is responsible for creating goods and services (Stevenson, 1999). Organizations exist primarily to provide services or create goods, hence, production is the core function of an organization. Without this core, there would be no need for other functions. The production function is one of the three (3) major functions performed by a typical business organization. (See figure I).

Fig. 1: The three Basic Functions of Business Organization



Source: Stevenson, W.J. (1999) Production Operations Management. 6th ed. USA: Irwin/McGraw-Hill

The production function exists not only in the manufacturing and assembly operations, which are goods-oriented, but also in areas such as health care, transportation, food-handling, banking and retailing, which are primarily service-oriented.

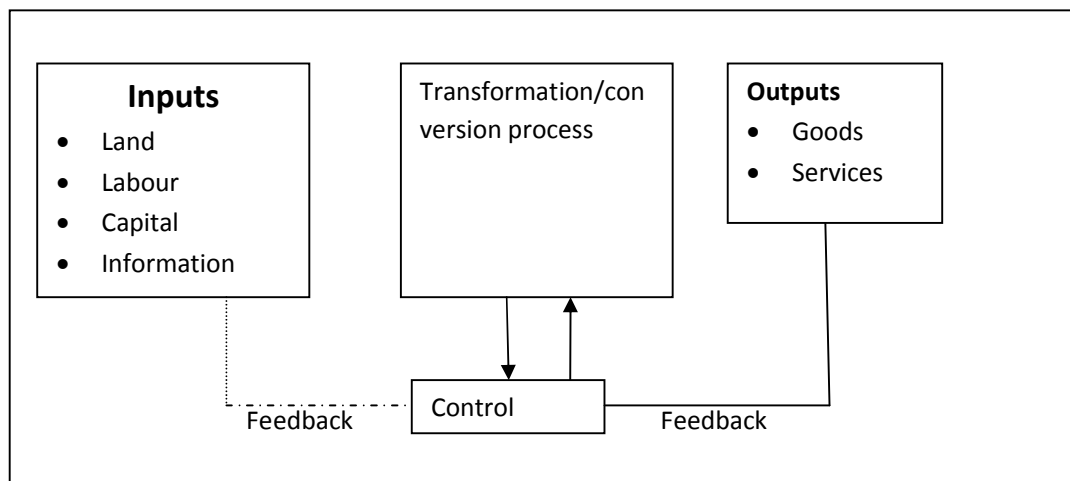
The types of production/operation functions include;

1. Goods producing (farming, mining, construction, manufacturing, power generation),
2. Storage/transportation (such as warehousing, trucking, mail service, moving, taxis, buses, hotels, airlines),
3. Exchange (such as retailing, wholesaling, banking, renting or leasing, library loans),
4. Entertainment (such as films, radio and television plays, concerts, recording etc), and,

5. Communication (such as newspapers, radio and TV Broadcasts, telephone, GSM networks and satellites).

The production function involves the transformation of raw materials into meaningful goods and/or services. Figure 2 reflects how inputs are used to obtain finished goods and services using one or more transformation processes (e.g. storing, transporting, cutting etc). To ensure that the desired outputs are obtained, measurements are taken at various points in the transformation process (feedback) and then compared with previously established standards to determine whether corrective action is needed (control).

Fig. 2: The Production/Operation Function



Source: Stevenson, W.J. (1999) *Production Operations Management*. 6th ed. USA, Irwin/McGraw-Hill

Lockyer (1983) developed a conceptual framework (3ps) on production management as that activity which entails;

- The product (performance, aesthetics, quality and reliability, quantity, selling price or production costs and delivery dates);
- The plant (future possible demands, design and layout of buildings, performance and reliability of equipment, maintenance of performance, safety of installation and operation, social responsibility).
- The processes (availability of capacity available skills, type of production, layout of plant and equipment, safety, maintenance requirement, costs to be achieved).

The determinants of a successful and continuous operation of any organization are: quality, reliability, delivery and cost of the product/ service, coupled with the cash flow of the organization. The production of operations policy in place must be accompanied by policies on matters as: utilization of plant, labour, investment in stock, cost and by understanding the technological imperatives of the product. Table I shows the various examples of inputs transformation and outputs. A canned food item, which is a finished product on its own can only be derived through the use of inputs (that is, spices, metal sheets, water, energy labour,

building and equipments) and processed through cleaning, making cans, cutting, cooking, packing and labeling among others.

In health services, a healthy individual is a service output which requires inputs as doctors, nurses, hospital space, medical supplies, equipments, laboratories and processed through examination, surgery monitoring, medication and therapy.

Table I: Examples of input transformation and outputs

Inputs	Transformation	Outputs
<ul style="list-style-type: none"> • Land • Human <ul style="list-style-type: none"> Physical Intellectual • Raw Materials <ul style="list-style-type: none"> Water Energy Chemicals Metals Wood • Equipment <ul style="list-style-type: none"> Machines Computers Trucks Tools • Facilities <ul style="list-style-type: none"> Hospitals Factories Offices Retails Stores • Others <ul style="list-style-type: none"> Information Tune 	<ul style="list-style-type: none"> • Processes <ul style="list-style-type: none"> Cutting Drilling Teaching Farming Mixing Packing Canning Consulting Copying Faxing 	<ul style="list-style-type: none"> • Goods <ul style="list-style-type: none"> Houses Automobiles Clothing Computers Machines Televisions Food Products Textbooks Magazines Shoes CD Players • Services <ul style="list-style-type: none"> Health Care Car Repair Delivery Gift Wrapping Legal Banking Communication

The Production System

The individual involved in the production/operation function is the production manager or the operations manager. He is concerned with the acquisition of human and material resources and the conversion of those inputs into outputs, using one or more transformation processes such as workers, equipment, facilities, allocation of resources, work methods and product/service design. What makes the production/operations task a system is the interrelationship that exists between the production personnel (people), materials and the machines, which ultimately results in a finished output (product).

The primary function of the production manager is to guide the system by decision making. Some decisions affect the design of the system and others affect the production/operation system.

System design involves decisions that relate to system capacity, the geographic location of facilities, arrangement of department, and placement of equipment within physical structures, product and service planning, and acquisition of equipment.

System operation involves the management of personnel, inventory planning and control scheduling, project management and quality assurance.

Stevenson (1999) identified three (3) major differentiating features of a production/operation system.

1. **Degree of standardization:** The output of a production can be standardized for uniformity or customized to meet with specific individual consumer tastes. Standardized output means that there is a high degree of uniformity in goods or services. Standardized goods include newspapers, canned foods, radio, cars, television, computers automobile tyres, pens, pencils, etc, while standardized services include automatic car-washers, televised newscasts, taped lectures and commercial airline service. Customized products include eye-glasses, custom fitted clothing, window glass (cut to order), customized draperies, while customized services include tailoring, taxi rides and surgery.
2. **Types of Operation:** The degree of standardization and volume of output of a product or service influence the way a firm organizes production. A one- scale single product such as the construction of a building will be a type of operation, while oil refining is a continuous process. In-between these two (2) extremes are customized individual units of output, such as custom made wardrobe, special purpose machine, auto-repairs, paints etc.
3. **Goods Vs services operation:** Manufacturing and service organizations differ chiefly because manufacturing is goods oriented and service is act oriented. The differences involve:
 - Customer contact: Service involves a much higher degree of customer contact Customer than manufacturing.
 - Uniformity of input Service operations are subject to greater variability of inputs than typical manufacturing operations. Each patient, bank customer, each lawn or auto-repairer in a service presents a specific problem that often must be diagnosed before it can be remedied, job requirements for manufacturing are generally more uniformed than those for services.
 - Labour content of jobs: There is variation of inputs between product and service operations. Service require a higher labour content, manufacturing with exceptions can be more capital intensive (i.e. mechanized).
 - Uniformity of output: Output of services varies much more and slower when compared to goods. Manufacturing often experience low variability, because operations usually result in uniformed products.
 - Measurement of productivity: This is often more straightforward in manufacturing due to the high degree of uniformity of most manufactured items. Job requirements and demand

intensity variations make measuring much more difficult in service operations. For example, the productivity of two doctors may be difficult to compare. One may have a large number of routine cases, while the other does not.

- **Quality Assurance:** is often more challenging in service when production and consumption occur at the same time. Higher variability of input creates additional opportunity for the quality of output to suffer, unless quality assurance is actively managed. Quality at the point of creation is typically more important for services than for manufacturing, where errors can be corrected before the customer receives the output.

Configuration Of The Production System

Banjoko (2002) suggests that The production system can be configured into three (4) basic types:

- a. Repetitive production
- b. Job production
- c. Project production
- d. Hybrid production (neither project nor job).

1. Repetitive Production: This is usually large in volume: and it is from day- to-day operations. Examples of repetitive production are refineries, banking service, teaching activities in universities and research institutes. Many companies producing goods and services can be classified as repetitive production (because the same things are repeated daily). There are two (2) types of processing in repetitive production.

- i. **Processing of Materials that Pour or flow:** Examples of materials that pour or flow are liquid, gases, grains, and nails which are products of process Industry. The process industry is usually capital intensive, but it has relatively few day to-day production problem. However, advanced planning is important in relation to the acquisition of fixed resources, and this is why it is capital intensive.
- ii. **Processing of discrete items: (Separated or unconnected items).** There are of two (2) types:
 - a. Products which require much handling but require little processing. Egg production, pottery making, small-scale weaving and garment manufacturing are good examples.
 - b. Products which require extensive part fabrication (that is, production into standard parts), to be followed by assembling to new production. Examples of these are assembling of vehicles and furniture making.

2. Job Production: Job production is usually low in volume. Examples of places where job productions can take place are restaurants and machine shops, while examples of products of job production include, making of tools, repairing of equipments and hairdressing.

3. Project Production: Project production is usually large in size and it takes a long time to complete. It can take months or years to complete it, both job and project production are low in volume, but job is small in size, while project is large in size. Each project comprises of adverse mixed activities and examples of project production include road construction projects, building projects, and marketing research projects.

Apart from the above three (3), we have the hybrid production type.

4. Mid-Way Production (i.e. Hybrids):

- a. Hybrids of Repetitive and project Productions: These are products which fall mid-way. This is limited in quantity but large in size and usually multiple units are produced. Hence, it is not a project and it is not large enough to be designed fully as a repetitive production. Therefore, it lies mid-way between repetitive and project productions. Examples are production of boats, tramps and airplanes.
- b. Job/Lot Production (Lot or Batch)

This is an inter-face between repetitive and job productions. Most goods producing companies fall into this category and there are 2 main types in this category;

 - i. Those Producing to Stock (i.e. stocking up goods to keep)
where each successive batch of production may be in different models, different styles and size. Examples of such products include shoe making, drug production (Medication), Textiles and appliances production, paint production, etc.
 - ii. Those producing to Order (i.e making product as a result of order in large or limited quantities). Here, production depends on in- flow of orders. For example, production of special and highly distinct products, prestigious products as Rolls-Royce cars, sophisticated computer and some contracting work in general.

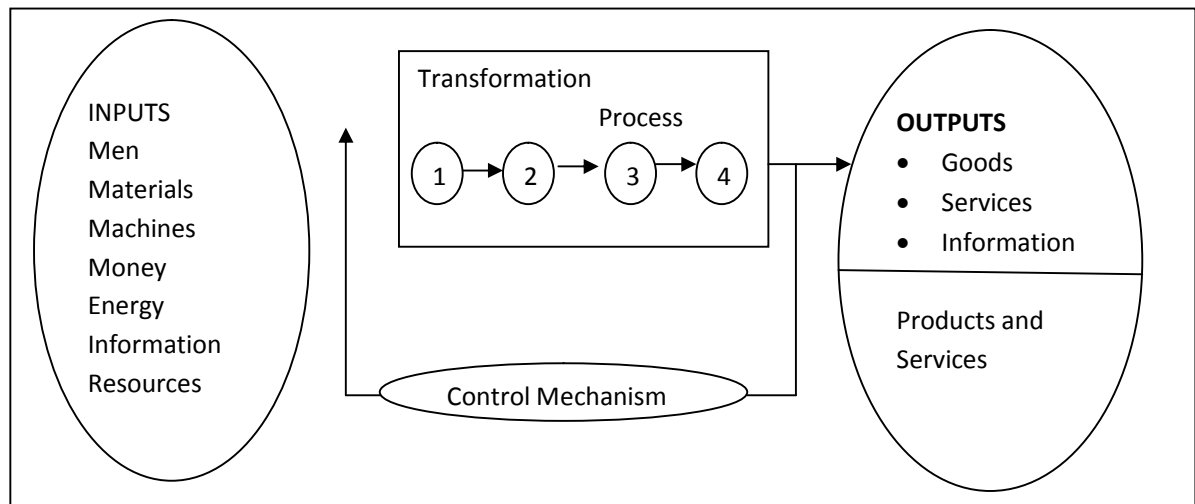
Criteria for Evaluating Effective Production System

Banjoko (2002) identified some criteria for evaluating the effectiveness of the production system. These are:

1. The volume of output produced per period.
2. The operating costs of the system in terms of amount of materials used, man-hour consumed per unit of output, amount of scraps or wastage generated by the production system per production run.
3. Production capacity utilization, that is, the extent of wastage, labour and machine idleness and space under-utilization.
4. Production or service quality and reliability.
5. On-time, delivery as reflected in the number of customers due date met or not met.
6. Production system flexibility in terms of the system's ability to cope with expansion or contraction in product volume or changes in product features or characteristics.
7. Frequency of production system failure as brought about by machine breakdown, strike, shortage of materials etc.

Figure 3 is a typical model of a production system that explains how the inputs of a production system are being transformed through different stages I, 2, 3, 4 (depending on the nature of the production process) before outputs are desired. The inputs are the men, materials, machines, money, energy and information, while the outputs are goods, services, and information. The control mechanism ensures standardization and consistency.

Fig. 3: A Typical Model of Production System.



Source: Banjoko, S. (2002) *Production and Operations Management. Revised ed. Lagos Punmark Nig. Ltd.*

Concept Of Productivity

A business organization's success is determined to a large extent by the degree of its productivity. The productivity of an organization comprises of the various inputs made by labour, equipment and capital, usually channeled towards the realization of specified objectives. Cascio (2006) gave a general definition of productivity as "a measure of the output of goods and services relative to the input of labour, capital and equipment". It is a culmination of the human and material resources of an organization. The founding father of management practice, Peter Drucker, portrayed productivity as a combination of organizational effectiveness and efficiency. He opined that, effectiveness is the foundation of success, while efficiency is a minimum condition for survival after success has been achieved in clearer terms. Efficiency is concerned with doing things right, while effectiveness is doing the right things (Drucker, 1973). Hersey, Blanchard and Johnson (1996) corroborated the opinion of Drucker (1973) by saying that productivity concerns both effectiveness (the attainment of goal) and efficiency (resource costs, including those human resource costs affecting the quality of life), Stressing further that it is the ratio of the output of goods and services, divided by the inputs or resources used to produce those goods and services.

Mehring (2004) attributes recent productivity increase in organizations to the advent of information technology, where Innovative Human Resource practices in manufacturing (for example, production ideas drawn from non-managerial employees, job rotation and tying pay to performance), may account for as much as 89 percent of the growth in what economists call "Multi-factor" productivity. Multi-factor productivity is a measure of how businesses enhance production by combining workers and machines using technology, production processes and managerial practices.

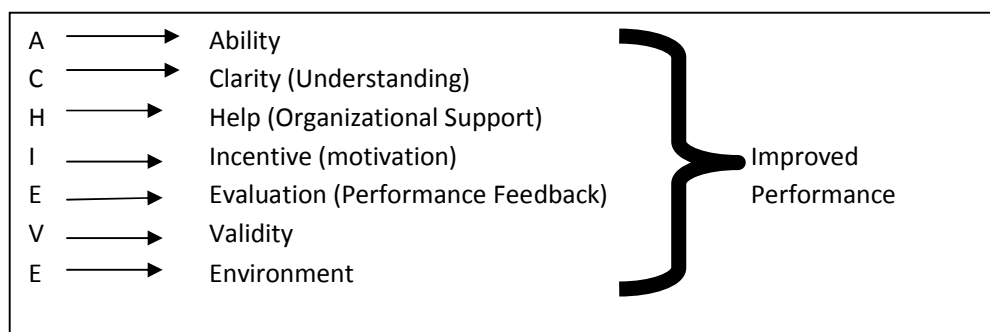
Hersey et al (1996) suggest that productivity can be improved by increasing the output, decreasing the input or both. Furthermore, improving productivity means getting more out of

what is put in. It does not mean increasing production through the addition of resources, such as time, money, materials or people. It is doing better with what one has. Improving productivity is not working harder, but working smarter (Cascio, 2006).

Omachonu and Ross (1994) expressed productivity improvement through specific focus on technology and capital equipment to reduce the input of labour cost, while using industrial engineering techniques to improve output. They further identified leader-follower interaction as the most important factor in organizational effectiveness.

Hersey and Goldsmith (1980) introduced the 'ACHIEVE' perspective as a way of helping managers to determine why performance problems may have occurred, and then develop change strategies aimed at solving those problems. The ACHIEVE model uses two (2) major factors in performance management: 'feedback; which means that the followers need to know not just what to do, but also how well they are doing it on an on-going basis, while 'validity' behaves the manager to continually check for validity in all personnel practices, such as job analyses, recruitment, appraisal, training, promotion and dismissal. The Acronym 'ACHIEVE' is illustrated in the model shown in Figure 4.

Figure 4: The 'ACHIEVE' Model



Source: Hersey, P and Goldsmith, M. (1980) 'A situational approach to performance planning' in Hersey, P, Blanchard, K. H. and Johnson, D. E. (Eds.), *Management of organizational behaviour: Utilizing Human Resources*. 7th ed. Englewood Cliffs NJ: Prentice Hall.

The seven-letter word that is synonymous with 'to perform' is 'achieve'. 'Productivity', often used synonymously with 'Performance', can be effectively improved if the seven-letter word in the acronym 'ACHIEVE' is applied.

'Ability' refers to the follower's knowledge, experience, and skill-the ability to complete the task successfully.

'Clarity' refers to an understanding and acceptance of what to do when to do it, and how to do it. To thoroughly have an understanding of the job, the follower needs to understand clearly what the major goals and objectives are, how they should be accomplished, and their priority (which objectives are most important at what times).

‘Help’ refers to the organizational help, or support, that the follower needs to effectively complete the task in terms of adequate budget and personnel, suitable equipment and facilities and necessary support from other departments.

‘Incentives’ are those things that motivate the managers to do the right thing, such as rewards and other benefits, aside from their basic wages.

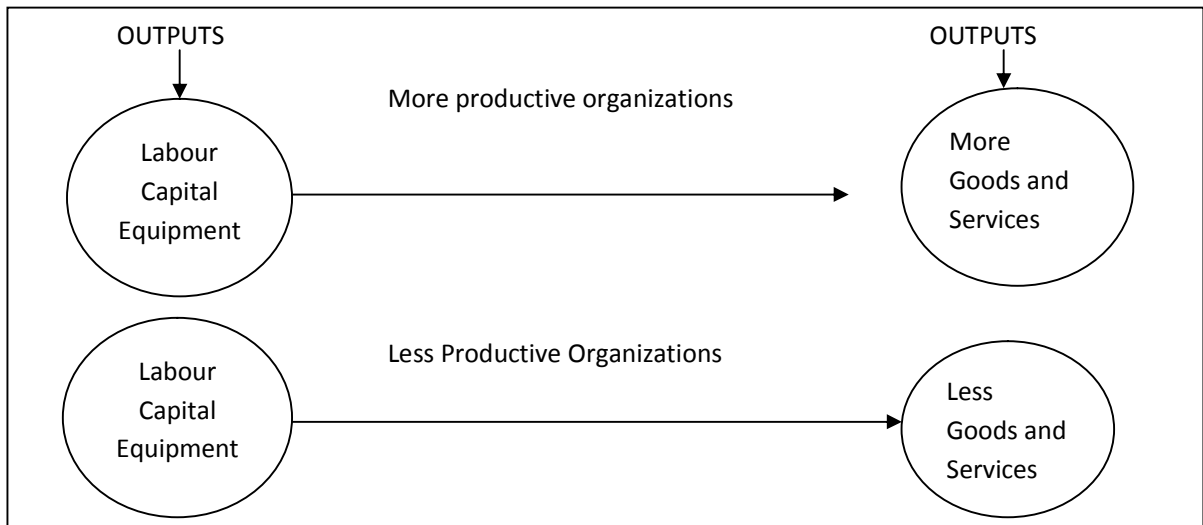
‘Evaluation’ refers to the day-to-day performance feedback as well as formal periodic reviews of the managers on the job. Remedial actions become necessary where the manager is falling below standards in the area of job performance.

‘Validity’ refers to the appropriateness and legality of human resources decisions made by the manager

‘Environment’ are those external factors that can influence performance even if the individual has all the ability, clarity, help and incentive need to do the job. Key elements of the environmental factors include competition, changing market conditions, government regulations, suppliers and others.

Figure 5 reflects the difference between ‘more’ productive and ‘less’ productive organizations.

Figure 5: Model of more productive and less productive organizations



Source: Cascio, W.F. (2006) *Managing Human Resources: Productivity, Quality of Work Life, Profits*. 7th ed. USA: McGrawHill. P.22.

The implication of the model in Figures is that more’ productivity organizations get more goods and services out of a given amount of labour, capital and equipment than ‘less’ productive organizations.

Cascio (2002) introduced steps that managers can take in their drive for improvement in productivity. These include:

1. Downsizing, restructuring and mergers.
2. Helping to make both unionized and non-unionized workers aware that their rewards depend ultimately on production.
3. Recognizing that there is no “quick fix” approach. Workers training, work design and product engineering must all be linked to the priorities of the business plan and integrated into a comprehensive productivity- improvement strategy and,
4. The recognition of the crucial importance of continuous improvements in quality (an important aspect of productivity improvement) through prevention of errors.

When productivity or ‘performance’ is improved, there is need for ‘performance management’ as a strategy to ‘keep up’ the improvement.

Performance management integrates the situational leadership concept and the ACHIEVE model. Hersey et al (1996) identified the three (3) major steps in implementing performance management as:

- 1 - Planning → which involves setting objectives and directions for followers at the beginning of a planning period and developing plans for achieving those objectives.
- 2 - Coaching → which refers to the day-to-day feedback and development activities aimed at enhancing performance plans, and
- 3 - Performance Review which is the overall evaluation of performance for specific planning period.

Production Management

Production or operations management, according to Stevenson (1999), can be defined as the management of systems or processes that create goods and or provide services. Lockyer (1983) had earlier defined production management as an “incorporation of so many diverse tasks that are inter-dependent, such as the product, the plant, the processes, the programmes and the people, for the purpose of creating utility”. Production management is continually changing as external and internal pressures change. New legislation on, say, product liability may thrust the ‘product area’ into prominence, while a strike at a supplier may cause ‘The programme area to be emphasized.

Banjoko (2002) suggests the cardinal objective of production and operations management as that of effectively and efficiently bringing together, a set of scarce resources (people, materials, money and machines) in a manner that would result into the production of goods and services that have economic value to the society. In addition to this fundamental objective, the functionality or utility, value and other auxiliary objectives were identified. The utility objective stresses on the ability of the product from a production or operation to be able to meet specific or general needs, which justifies the reason for the product’s existence. The value objective stipulates the need for the product to add corporate value and profitability to the organization, while the auxiliary objective bothers on the need to ensure the maximum

utilization of all resources including both labour and machines, and the maintenance of stable employment.

Origin of Production/operations Management

Production came into existence since the ancient times. The Great Wall of China, the Egyptian Pyramids, the ships of the Roman empires and the roads and aqueducts of the Romans are example of human ability to organize for production. In the ancient Africa, human beings with simple tools manufactured clay pots, built mud houses, made tie-and-dye clothing, and performed black smithing and goldsmith jobs among many others. Services were rendered in dane-gun repairs, repair of sandals, compound cleaning, etc. The productions of goods were made for Barter arrangements before the advent of 'money as a means of exchange. The modern factory system had their roots in the Industrial Revolution.

The Industrial Revolution began in the 1770s in England and spread to the rest of Europe and the United States during the 19th century. At this time, machines were invented to replace the simple crude tools available for use. Then, a number of inventions changed the face of production forever by substituting machine-power for human-power. The most significant of these was the steam engine invented by James Watt in I 764 because it provided a source of power to operate machines in factories. In the earliest days of manufacturing, goods were produced using craft production, which involved highly skilled workers using simple flexible tools to produce goods according to customer specifications. Craft production had major shortcoming because production was very slow and costly as a result of few skilled craftsmen who custom-fitted sub-parts. Again when parts failed, the replacements also had to be custom-made, which was slow and costly too. Another shortcoming was that production costs did not decrease as volume increased; there were economies of scale, which would have provided a major incentive for companies to expand, but rather, small companies emerged with their own set standards. A major change occurred that gave the industrial revolution a boost: the development of standard gauging systems. This greatly reduced the need for custom-made good. Factories begin to spring up and grow rapidly, providing jobs for countless people who were attracted in large numbers from rural areas.

Despite the major changes that were taking place, management theory and practice had not progressed much from early days. What was needed was an enlightened and more systematic approach to management.

The scientific management era championed by Fredrick Winslow Taylor focused on the observation, measurement, analysis and improvement of work methods and economic incentives, as means of maximizing outputs. Frank Gilbreth, Henry Gantt, Harrington Emerson and Henry Ford (among others), were also members of the scientific movement.

Whereas the scientific management era heavily emphasized the technical aspects of workdesign, the Human Relations movement emphasized the importance of human element in job design. Frank and Lillian Gilbreth, Elton Mayo, Douglas McGregor, William Ouchi all propounded theories grouped under the Human Relations Movement.

The Factory Movement, which consisted F.W. Harris, Bell Telephone Labs, H. F. Dodge, H. G Romig and W. Shewart developed quantitative and statistical procedures for sampling and quality control in production operations. At first, these quantitative models were not widely used in industry, but the on-set of the World War I (1937-1945) changed that. The war generated tremendous pressures on manufacturing output, and specialists from many disciplines combined efforts to develop and refine quantitative tools for decision-making, resulting in decision models for forecasting, Inventory management in decision models for forecasting, inventory management, project management and other areas of production operations management.

During the 1960s and 1970s, management science techniques were highly regarded, in the 1980s, they lost some favour. However, the widespread of personal computers and user-friendly software in the workplace may have caused the resurgence in the popularity of those techniques.

Overtime, a number of trends began to command considerable attention in business as they influenced planning and decision-making in production. They relate to competition: particularly foreign competition, which has tremendously impacted on the activities of manufacturing companies around the world. Those recent developments include:

- Global market place: where nations like the United States, Canada, Mexico among over 120 countries opened trade agreements such as North American Free Agreement (NAFTA) and the General Agreement on Tariff and Trade (GAIT) to open their economics, reduce tariffs and subsidies. And expand protection of intellectual property.
- Creation of Operations/Production Strategy for the overall success of their business.
- Total Quality Management (TQM) focused on the improvement of the quality of goods and services. Key features often include a team approach, finding and eliminating problems, emphasizing on serving the customers and continuously working to improve system.
 - Flexibility in operations.
- Time reduction in the production process period in order to gain competitive edge. If two (2) companies can make the same product of equal quality, the faster company will invariably get the sale.
- Technological advances that have led to a vast array of new products and process. The computer will undoubtedly continue to impact on production/operations, while more sophisticated machines will be instruments to rapid and more standardized products and services. Other trends include, re-engineering, corporate down-sizing, environmental issues, supply chain management etc.

Production Management Functions

There are basically 9 (nine) production management functions. These are:

1. Planning for aggregate demand: is the planning for a line of goods and services for which there is efficient demand.

2. Fixed Resources Planning: This involves laying out capital such as plants and equipment. The level of aggregate demand is related to fixed resources planning, primarily because there is no sense in laying out capital for plants and equipment without customer demands for the goods and services that those fixed resources will produce. There is need to ascertain customer demand for a product, so as to plan the extent of plant and equipment required.
3. Adjustable Capacity Planning: This refers to adjustable resources. Those are the resources that can vary (that is, can change: unstable) and they include labour, material and tools. This may be planned for on the basis of an aggregate demand forecast usually for a period of 3 months.

The difference between adjustable resources and fixed resources is that adjustable resources can be built up (that is, one can add to it) and can also be depleted (that is, one can take away from it). While it often takes some years to replace a fixed resource, (be it plant or equipment) the adjustable capacity plan, can specify the number of days per week for which a fixed resource like plant can operate.

4. Planning for Item Demand: Consists of customers order or a forecast of customer order Item demand includes the specific models like styles, colours, sizes and types of goods and services. (this vary with respect to the differing tastes of consumers). In planning for item demand, the production manager should recognize that he can modify or deny a customer's order in the line of order already stored (that is, based on the number of orders they have already).
5. Master schedule: This shows the time completion of end products or services in which there is demand (that is, when the product requested for by the customer is to be completed). The master schedule is constrained by production capacity plan, while item demand is an input into the master schedule.
6. Inventory Planning: This is relevant to manufacturing companies. Although, for some human service operations like Law firms, accounting firms, there maybe If the inventory or none to plan for, but for goods producing companies, inventory planning is a major activity. For example, products or pieces of products found on the master schedule may be divided into a variety of sub-assembly and parts within the right time and the right quantity as contained in the master schedule.
7. Operation Scheduling and Control: Every part of sub-assembly and assembly (that is, the various parts used to form an assembly) is a separate plan order, consequently to enhance meeting the time specified for the completion of orders. Orders may be scheduled and controlled as jobs, lots, batches or repetitive (continuous), production process. The inputs into operation scheduling and control are: (i) inventory plans for all the items to be scheduled and controlled, and (ii) an indication of availability of resources.
8. Production Design: It involves the design of products or services, the design methods, processes and work measurement. The design of product and service is an engineering function. As the work proceeds, it is measured and compared with the plan. However, when plans go wrong, a revised plan must be issued, and in addition to this, supervisors must employ motivational techniques on the subordinates to get the plan on course.

9. Resource Dynamics: Resource dynamics in production is concerned with human inputs, facilities, placements and material handling. Such as deployment of labour, plant location, plant lay-out, maintenance management, inventory dynamics and control. It concerns itself with acquisition, storage and disposal of human and material resources.

Production Management Practices

Production management practices include such activities as:

1. Production Planning and Control
2. Budget and Budgetary Control
3. Product Control/Quality Control

1. Production Planning and Control

All levels of management require some forms of decision making, though should not be taken arbitrarily, but must follow logical steps so that such decision can stand a reasonable test of time.

The decision made is a function of the objectives of the organization and the organizational policy. Taken together, the objectives and policies form a 'plan' for the operation of the organization. Planning occupies a considerable portion of the manager's time, and it is worthwhile to try to identify those characteristics which should be found in a useful plan.

Lockyer (1983) identified seven (7) basic features of a plan as that of being: explicit, well understood, accepted, adaptive, compatible with the internal and external constraints, monitorable and a stimulus to action.

The production manager in a standard organization is faced with long term and short-term market and sales forecasts. The long term market forecast will be based upon information on such matters as:

- a. Levels of industrial production (both national and international)
- b. Government expenditure
- c. Labour variability
- d. Possible changes in price structure
- e. Variations in living standards
- f. Competition both national and international
- g. Market potentials
- h. Possible new products Change in technology
- i. Company resources
- j. Company history and
- I. Long-term company objectives, policies and plans.

A long term forecast is very essential, especially when considerable expansion is anticipated by the management of the organization. For example, new office complexes and production plants may be desired over a span often to fifteen (10- 15) years of operation, and these need to be adequately planned for.

The short-term forecast is usually the basis from which all production activity stems. It is a prediction convening the next budget period, usually twelve (12) months of:

- a. Products sold
- b. The price of products
- c. The quantity of each product
- d. The quality and reliability of each product, and
- e. The dates by which the products are to be available

After making plans, the production activities or performance must be measured against some pre-determined criteria. Controlling involves:

- a. The definition of production objectives;
- b. Establishment of pre-determined production standards;
- c. Measurement of actual production performance
- d. Comparison of actual against standards;
- e. Corrective action towards the realization of set objectives, where performance falls short of the set standard (Otherwise called 'remedial action).

The industrial and product quality control system are often saddled with the responsibilities of planning, publishing, measuring, comparing, and reporting, so that corrective steps can be taken.

The satisfactory operation of an industrial/production control system depends on the existence of the following characteristics:

1. Clear definition of objectives. Without such definition, determination of effectiveness may be difficult.
2. Control must be determined by the 'choice' exerted by the organization. The greater the choice, the finer the possible control, but excessive choice can be expensive.
3. Any measurement must be of appropriate precision.
4. Information gathered needs to be pertinent.
5. Comparisons need to be made at intervals so that useful actions can be taken.
6. Reports of comparison must be feedback in a form acceptable to the active department.
7. The information collected by the system must be correct, at least consistent.
8. The number of stages through which information is passed while being feedback from the output to the active portion of the system should be kept as low as possible.

2. Budget and Budgetary Control

A 'budget' is a forecast of intended activity, which if properly prepared and used, should have the capability of enhancing an explicitly-designed control system in an organization. Budget preparation is usually coupled with the financial implications.

The following are absolutely necessary:

2. Estimated forecast covering material content and the direct labour content in operation-hours of the required production.
3. Estimates on maintenance, quality assurance, wages, cost accounting, production control, production engineering, design and development, and managerial staff.
4. Estimates on other indirect staff for example: the human resource for research and training.
5. Estimates on general expenses such as rent, rates, insurance, tax, heating, lighting and soon.
6. Expenditure and anticipated revenue must be well featured to ensure the feasibility of the budget.

The importance of budget preparation in production cannot be overemphasized, since it helps in disseminating information to the management on the anticipated activities within the organization over a specific period of time, usually twelve (12) calendar months (one year).

Once a budget has been drawn, it can be used as an instrument of control by continually comparing actual and budgeted performance (Lockyer, (1983). Budgetary control, like any other control system involves:

1. Planning- which involves the preparation of the budget
2. Publishing - that is, informing each production executive of what is expected of him.
3. Measuring the performance of the production executive in line with some consistent scales.
4. Comparing performance with expected standards stipulated in the budget plan.
5. Reporting the relationship between actual and stipulated budget expectations, and
6. Correcting the behaviour of the system or modifying the plan itself.

In preparing the budgetary control statement, the following points should be observed: (i) information should be accurate, or at least known for accuracy (ii) information should be pertinent (iii) information should be adequate and up-to-date.

3. Product Control/Quality Control

Most products are built up from a number of components and, if the final product cannot be standardized, then it may not be possible to standardize some of its components. Organizations should embrace the following, for effective product control:

1. - Use industry agreed standards if possible
2. - Use company agreed standards if possible
3. - Standardize raw materials
4. - Standardize components
5. - Simplify identification of raw materials and components
6. - Standardize methods
7. - Standardize production routes
8. - Standardize plant and equipment

It is generally accepted that there are three (3) factors that determine the acceptability of a product to a consumer:

- a. Quality and reliability
- b. Delivery
- c. Price

‘Quality’ simply put, is “fitness of a product for action’ This definition puts the consumer need and the belief in his needs in designing a product.

‘Reliability’ is the ability of a product to continue functioning at an accepted quality level. A quality policy requires management to continuously;

- i. identify the customer needs and his perception of his needs;
- ii. Assess that total ability of the organization to produce the product economically;
- iii. Recognize the neither ‘absolute’ quality nor ‘absolute’ reliability can exist in an imperfect world, and that therefore, it is essential to set down the acceptable quality and reliability levels.
- iv. Ensure that the product is well understood at all levels.
- v. Obtain feedback of information from the market, and
- vi. Monitor performance by the manufacturing unit.

Delivery’ addresses the availability of the product at the customer’s point of need. It is a major task for the product organization to ensure that the product reaches it consumers at a price as affordable as possible.

Quality control function is required in the organization in order to ensure continued product acceptance. The point of good peak is when the product quality is a good match with customer expectation. Observe this:

$PQ=CE >$ Satisfied customer

$PQ=CE \Rightarrow$ Delighted customer

$PQ=CE \Rightarrow$ Dissatisfied customer.

Where $PQ =$ Product Quality and $CE =$ Customer Expectation

The above categories of customers are achievable depending on the Product Quality. Satisfied and delighted customers are likely to make repeat purchases, while a dissatisfied customer may not likely repeat purchase, because of the cognitive dissonance established in his “Psyche” because of the sub-standard product quality.

The Production Plant

The production plant is the territory within which the production activity takes place. It involves the interaction of human and material resources. The location of the plant may well

have a substantial effect upon the operation of the production unit, and upon the group of producing sub-units if it is geographically dispersed in an area.

The following factors should be considered in the choice of location:

1. Integration with other group companies
2. Availability of labour
3. Availability of housing
4. Availability of amenities
5. Availability of transport
6. Availability of raw materials
7. Availability of car parking space
8. Adequacy of circulation
9. Availability of service
10. Suitability of land and climate
11. Local building and planning regulations
12. Room for expansion
13. Safety requirements
14. Site cost
15. Political situation
16. Special grants.

The detailed design of the production edifice or building should be of right standards and must address:

1. The type of accommodation required for the purpose of production activity.
2. Latest possible completion date
3. Quality/life of the new building
4. Proposed site; and
5. The maximum cost
6. Other issues, such as the building size and accessibility, lighting, heating and ventilation, services, disposal of waste, etc.

The plant 'layout' (that is, the physical disposition of the plant and of the various parts of the plant). The layout will affect the organization of the plant, the technology by which the production task is carried out, and the flow of work through the production units.

However, a good plant layout should be such that will ensure;

1. Maximum flexibility that will enhance plant modification to meet changing circumstances.
2. Maximum co-ordination among the interacting sub-units of the plant.
3. Maximum use of volume -a plant must be considered as a cubic device as there should be enough space for both human and item quantities.
4. Maximum visibility -such that all men and materials should be readily observable at all times (transparency of operation).

5. Maximum accessibility. Equipments should have a feature of being 'movable' to avoid rigidity of permanent installation.
6. Minimum distance, which allows for proximity amidst sub-production plants. All movements should be both necessary and direct.
7. Minimum handling -that will allow for the use of conveyors, lifts, chutes, hoists and trucks.
8. Minimum discomfort-draughts, poor lighting, excessive sunlight, heat, noise, vibrations and smells should be minimized and if possible, counteracted.
9. Inherent safety-all layout should be safe and no person should be exposed to danger, both workers and passers-by.
10. Maximum security-safeguards against fire, moisture, theft and general deterioration should be provided, as far as possible, in the original layout rather than in later accretions of cages, doors and barriers.
11. Uni-directional flow -work lanes and transport lanes must not cross.
12. Visible routes- lines of travel should be well-defined, and if possible, clearly marked.
13. Identification-working groups must be properly tagged or addressed for easy identification. The sub-units of the production plant must be easily identifiable.

It is the major task of the organizational management to ensure that the plant is adequately equipped and maintained to ensure continuous output standard.

Production Management Problem In Nigeria

The Nigerian productive sector is in crisis as its average contribution to the nation's

Gross Domestic Product (GDP) over the past few years has not gone beyond five percent (Banjoko 2009).

The production function problem being faced by the Nigerian economy can also be traced to the out-flux of production talents to other parts of the world (especially the developed nations) which we call 'brain-drain' with the basic objective of earning foreign currencies (Pounds sterling and dollars for example) that carry very high economic values when compared to the Nigerian Naira.

Banjoko (2002) and Banjoko (2009) uncovered the problems posed by the current harsh economic situation as a major bottleneck to the management of production function.

- i. Problem of coping with high costs of production.
- ii. Shortage of essential raw materials, which has led to cuts in production shift, which has in turn, worsened the level of production capacity utilization.
- iii. Poor customer purchasing power as a result of high cost of domestic production.
- iv. Scarcity of spare parts which has made the life span of most of the productive equipment shortened.

A good number of companies patch and re-condition old and out- dated equipment which has drastically reduced production efficiency.

- v. There is low capacity utilization in most major industries in Nigeria. Interest rates are high at all times, and companies are faced with the problem of low demand, which invariably into 'less than' optimal utilization of available production capacity.
- vi. Political instability, social unrest and poor state of infrastructure such as erratic electricity supply and poor state of the Nigerian airways, roads and railways coupled with social and personal insecurity of lives and properties have created extra problems for the effective management of production functions in Nigeria.
- vii. Production function in Nigeria is plagued also because the banks that are supposed to provide funds for the recovery and revitalization of the ailing manufacturing companies are unwilling to invest their funds in a distressed sector. They are more interested in providing funds for religious organizations to build their cathedrals and to other companies in the service sector that unfortunately cannot create as much jobs as the real sector companies.
- viii. The slump in the stock market with a loss of over N10 trillion to date is very worrisome and has weakened the confidence of any investor in the capital market. This has badly affected the Nigerian manufacturing sector under which the production function in Nigeria is domiciled.
- ix. The shortfall in the oil revenue as a result of falling oil prices in the world market has affected the capital project commitments of the Nigerian government negatively, in the sense that the re-building and upgrading of critical infrastructure necessary for the revival and survival of the Nigerian manufacturing sector has become highly unachievable.

Further-more, importation of raw materials and equipment needed for the manufacture of some essential products has become problematic because of the highly devalued nature of the Naira, as it de-limits the quantity of imported raw materials and finished goods. This has led to the death of so many manufacturing businesses in Nigeria. The production function problem in Nigeria is also not unconnected with the slow economic progress caused by the mono-cultural nature of the country, high population growth rate, import dependency and political instability (Omorogbe and Ubeagbu, 2007).

Ojobo (2006) suggests that the Nigerian worker is said to be lazy, indolent or careless and less committed to work when compared with workers of the western world, has very low productivity, has poor and careless attitude to work and has inherited a set of 'ancestral' psychological traits which makes it rather difficult for him to cope with the demands of industrial work. These assertions clearly show that Nigerians, (Both academic and non-academic), who have had cause to comment on workers attitude to work, have used the concept in a way that denotes it as a uniform property, that deleteriously affect productivity. Ogundele (2000) and Ogundele, Hassan, Alaka and Yusuf (2009) found acts of indiscipline, including bribery and corruption as the second most important inhibitors of productivity in the businesses of indigenous entrepreneurs in Nigeria. Again, Inyang (2001) opined that organizations in Nigeria fall short of good management of human and other resources which have caused the problem of converting these resources into productive use for the benefits of the system. Inyang (2008) further stressed that a basic Nigerian problem is that of human factor acquisition, management, development and maintenance.

Environmental pollution caused by the operation plants of manufacturing companies has become a major issue in Nigeria major cities, and these include:

- a. Dust emission from cement plants.
- b. Wood dust from sawmills
- c. Fumes and effluent from industries,
- d. Littering of drainage systems and road sides by non biodegradable household products such as polythene bags, water sachets, plastic containers etc.

This pollution has been frowned at by a sizeable number of health conscious Nigerians and other authorities, and this has affected production companies from reaching their maximum production output. This challenge is often faced by operation plants located close to residential areas in the cities and sub-urban areas (Okafor, and Doyin-Hassan, 2008).

Managers often experience an ethical dilemma when they confront a situation that requires them to choose between two (2) or several courses of action. A wrong choice made will negatively affect productivity. The production function therefore can be influenced by whatever unethical choice or behaviour adopted by the production manager. Lack of accountability unethical disposition at work and corrupt practices have become so pervasive and institutionalized in private and public organizations in Nigeria. Bribery, nepotism, favouritism, embezzlement, influence peddling, use of position for one's enrichment, bestowing of favours on relatives and friends, moonlighting, partiality, absenteeism, late-coming to work, abuse of public property, leaking and/or abuse of government information, divulging of organizational secrets and the likes have taken a serious toll on the production capacity of Nigerian organizations (Ezigbo, 2008 and Ogundele et al, 2009).

Antidotes To The Production Function Problem

Stevenson (1999) suggests a number of key steps towards enhancing the production function:

1. The development of productivity measures for all operations; measurement is the first step towards managing and controlling operations.
2. Identification of overall productivity' as the most critical part of the whole production system. Improvements on bottlenecks will lead to increased productivity.
3. Development of methods for achieving productivity improvements such as soliciting ideas from workers (perhaps organizing teams of workers, engineers and managers), studying how other firms have increased productivity and re-examining the way work is done.
4. Establishment of reasonable goals for improvement
5. A clear expression of the fact that management supports and encourages productivity improvement and the consideration of incentives as reward for workers contributions.
6. Measurement of improvements and publication of such results.
7. A clear distinction should be drawn between productivity and efficiency Efficiency is a narrower concept that pertains to getting the most out of a given set of resources; productivity is a broader concept that pertains to effective use of overall resources.

Banjoko (2009) proffers the following options for the survival of production organizations (among others):

1. The need for a stable political and socio-economic environment.
2. Macro-economic stability.
3. Recognition of the manufacturing sector as a major tool for sustainable growth and development, which should be accorded due regard and priority in the scheme of things.
4. Removal of infrastructural, social and political constraints for the purpose of realizing the full potentials of the manufacturing sector There is need for massive investment in upgrading our state of infrastructure, especially power, railways, and ports. etc.
5. Stable and credible policies and programmes that will instill confidence in investors and encourage unrestricted in-flow of foreign capital.
6. There is need to encourage or compel banks (if necessary) to adhere strictly to Small and Medium Enterprises (SMEs) guidelines and allocate more funds to the production sector.
7. The Central Bank of Nigeria (CBN) should establish credit guarantee scheme for SMEs and all indigenous companies.
8. 8 Reduction of tariff on major raw materials as awayof reducing the high cost of production.
9. There is need to devise an appropriate industrial policy that would emphasize reforms in the manufacturing sector, particularly with respect to the development of industrial estates or clusters with full compliments of all required infrastructure.

Okonkwo (2007) suggests the establishment and implementation of a profitable business strategy that will re-invent the wheels of the production enterprise as a successful and profitable success.

Finally, Government should ensure that corporate organizations involved in the production function fulfill their social responsibilities of ensuring that their activities cause minimal harm to humans and the environment in which they operate.

Summary

The production function is one of the three (3) major functions of a business existence. The other two (2) functions are basically that of finance and marketing. This chapter attempts a conceptual definition of the production function, looking at the input transformation and output processes, the production system, features of a production system, configuration of the production system, concept of productivity, production management, origin of production/operations management, production management functions, production management activities such as production planning and control, budget and budgetary control, product control and quality control and the production plant.

The production management problems in Nigeria were identified and scholarly suggestions on how these problems can be ameliorated were proffered.

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