

**TITLE PAGE**

**ASSESSING THE IMPACT OF FACILITY LAYOUT FOR ENHANCING  
ORGANIZATIONAL PRODUCTIVITY (A STUDY OF MOTHERCAT  
CONSTRUCTION COMPANY KADUNA**

**BY**

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**BEING A RESEARCH PROJECT SUBMITTED TO  
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AWARD OF HIGHER NATIONAL DIPLOMA IN PRODUCTION  
AND OPERATIONS MANAGEMENT**

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## DECLARATION

I hereby declared that this research project work was written by me, **Luke Etafia** under the guidance and supervision of **Mr. Ibrahim B. Sardauna** of the Department of Management Studies, Kaduna Polytechnic. Kaduna.

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Signature and Date

## APPROVAL

This is to certify the research project entitled “**Assessing the Impact of Facility Layout for Enhancing organizational Productivity (A Study of MotherCat Construction Company, Kaduna)**” was carried out under strict supervision and has been approved for meeting the requirements for the award of Higher National Diploma in Human Resources Management, Kaduna Polytechnic.

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## **DECLARATION**

This project work is dedicated to Almighty God for his guidance and protection throughout my course of study.

## ACKNOWLEDGEMENTS

Unto Almighty God, I give all the glory, honour and praise for His grace and mercies that has brought me through.

My profound gratitude goes to my able project supervisor, **Mr. Ibrahim B. Sardauna** for accepting me as one of his student and has also taken the pains to read and go through my scripts and make very useful corrections and constructive suggestions, may the Almighty God, the rewarder of all things, reward you greatly and grant you the desire of your heart (Amen). To my project coordinator Hajiya Sa'adiyya Aliyu, my H.O.D. Mal. Bala Dzukogi and to all the Lecturers who had tutored me from day one in Kaduna polytechnic, I pray that God bless all of you.

## ABSTRACT

*The project work is aim at to assess the essence of facility layout in enhancing organizational productivity with specific focus on Mothercat construction company. Research question are draw up which is in line with the objectives which includes - to analyze the impact of facilities layout on production cost and organizational productivity and to ascertain whether plant layout has some influence on material handling cost. Various work carried out by other authors on a similar topic was reviewed. The research methodology with research design correlation studies to establish the relationship between facilities layout and productivity. The study population of 100 was drawn from both senior staff and senior staff and all was used to serve as the sample size and was administered to respondents for their response. The hypothesis accepted  $H_1$  which states that facilities layout has impact on organizational productivity while  $H_0$  is rejected that is facilities layout does not have impact on organizational productivity. Finally the research proffered some workable recommendations which include that the Mothercat construction company should adopt automated machines use in enhancing productivity and production costs. This will enhance production activities because low labour requirement will minimize operational costs and as such the machines capacity will increase production volume because of the organization competitive business environment.*

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Facilities layout is one of the long-term production plans in an organization. The entire production system depends on effective facilities layout. The fundamental objective of any manufacturing concern is to attain production efficiency at minimal operational costs and at a maximal output. An effective production plan outlines an effective production output which in turn improves organizational productivity. The type of facilities layout selected in an organization determines its productivity. This gave the researcher interest in writing on the selected topic. The production of carbonated drinks and bottled water through effective facilities layout has enhanced efficiency in consumer product and organizational objective. The selection of Product Layout in Mothercat Construction Company has great impact on its entire production system and improves its productivity over its competitors.

The type of facilities layout selected in Mothercat Construction Company outlines the suitable layout type for the operation system in the organization. The primary objective of Product layout is to ensure that the entire production cycle reflects the organizational production goal towards attaining an efficient output at a minimized operational costs and product standard. It has also increased production capacity. Therefore, effective facilities layout plays a vital in the attainment of production efficiency in a construction concern (Noori and Radford 2017).

## **1.2 Statement of the Problem**

Most construction companies do not give more emphasis on the facilities layout required for production efficiency. It is fundamental that facilities layout is given a very serious attention in an organization because this plays a vital function in the attainment of organizational productivity. The standard of a product or service is achievable through the effective layout of facilities.

## **1.3 Objective of the Study**

This research basically outlines some of the numerous benefits associated with the facilities layout. The objectives include among the following;

- i. To analyze the impact of facilities layout on organizational product quality and operational costs minimization.
- ii. To outline the impact of facilities layout on Mothercat Construction Company production volume.
- iii. To ascertain minimal material handling and movement in Mothercat Construction Company.

#### 1.4 **Research Questions**

The research questions focus on the major impacts of facilities layout. The study will answer the following questions. The idea behind asking these questions is to find out or evaluate to what extent has facilities layout impact on the productivity of Mothercat Construction Company.

The research questions will be:

1. What is the importance of facilities layout in production management?
2. How does product layout impact on productivity in Mothercat Construction Company?
3. How product layout does enhance production volume?

## **1.5 Research Hypothesis**

Ho: Facilities layout does not have impact on organizational Productivity.

Hi: Facilities layout have impact on organizational productivity.

## **1.6 Significance of The Study**

The importance of this study cannot be over emphasized especially when one takes a look at benefits derivable from functional product layout in an organized production system. This study opens up detailed areas of the study for those who may be interested in studying how to manage production of product in an organization. The study would be of benefit to private individuals, students, academicians and construction/manufacturing sector who wish to engage in production of consumer product will find it easy and useful especially by adopting efficient facilities layout in order to meet consumer's needs and organizational objective. It will enable them to place more emphasis on facilities layout, hence the present research will establish the validity of the research questions in businesses of our society especially Mothercat Construction Company establishment.

## **1.7 Scope of the Study**

This research project is based on existing literature. Secondary data and equally information from primary source is obtained. The secondary data includes existing information or data found relevant to the subject matter which are standard text books, journals, internet and the company's management guides. The primary data collected include interview, questionnaire and observation are obtained by sampling from the total population of the top and middle levels management. The aspect to be covered in this study is how the organizational productivity is achieved through effective facilities layout.

### **1.8 Limitation of the Study**

Some problems were encountered in the course of executing this research. The first was time constraint because of the courses of the second semester and this work requires that more time should be made available. Finance and transportation were other problem to some extent because money was needed to research on time and materials in the libraries, the internet and on site. It costs on money to go for data collection.

### **1.9 Historical Background of the Case Study**

MotherCat Nigeria Limited is located in Kaduna, Nigeria. Company is working in Construction equipment, Construction services, and Construction business activities.

MotherCat Nigeria Limited is a leading construction company offering integrated solutions and related services. MotherCat Nigeria Limited specializes in executing complex works that require the highest level of technical expertise and Nigeria-specific knowhow.

The company utilizes state-of-the-art construction methods and technologies to ensure that quality and innovation are prioritized for the benefit of clients. Core competencies cover all project phases, including planning, design, engineering, construction, maintenance and operation, for infrastructure, industry and building projects.

MotherCat Nigeria Limited, business is supported by vertically integrated operations, which augment efficiency and timely project execution. Subsidiaries and additional facilities make it possible to realize multifaceted construction projects at the highest level of performance. Excellence in health, safety and environmental protection, investment in the professional development of staff, as well as sustainable business practices are

fundamental components of Mothercat Construction Company corporate culture.

International Organization for Standardization (ISO) certification demonstrates that the company's management systems are well equipped to consistently meet clients' needs and quality is continuously improved. Furthermore, MotherCat is capable of developing green buildings that comply with Leadership in Energy and Environmental Design (LEED) requirements.

Listed on the Nigerian Stock Exchange, with a majority Nigerian shareholding

Portfolio includes infrastructure, industry, building and facility services  
Design and engineering capacities

Proven commitment to leading Health, Safety and Environmental Protection standards in accordance with international best practices

Quality Management System certified to fulfill the requisitions of ISO 9001:2008

Operating in compliance with the Nigerian Content Act

MotherCat believes that being a responsible corporate citizen is fundamental to sustainable business.

We actively seek out opportunities to support and advance the wellbeing of our staff members, as well as society and the environment in Nigeria.

Our teams operate with a strong sense of responsibility towards colleagues, clients, business partners and communities.

Corporate social responsibility programs are developed and carried out with the notion that, by focusing efforts on areas in need of social improvement, measurable progress can be made. We invest in the long-term training and education of our employees in order to sharpen their skills, for the benefit of their career, our company and the human capital development of Nigeria. Specialized training and workshops, as well as education opportunities on-the-job, from unskilled to specialist, result in qualified and well-developed professionals. Responsibility for Health, Safety and Environmental protection is central to our operations, and managing HSE process and performance is a top priority.

These tenets are predicated on a “Responsible Growth” philosophy, which means that we protect the health and safety of our employees and business partners, support communities and minimize our impact on the environment, while maintaining sustained growth and profitability.

The role of the Board is to ensure the Group's long term sustainable value to all stakeholders within an appropriate framework of governance, accounting, finance and further effective controls and policies.

The Board of Directors is collectively responsible and accountable for:

- Strategic direction and policies that take business risks, resources and opportunities into account
- The framework of control and accountability systems and reporting thereon
- The framework for risk assessment and management
- The proper management of company resources to achieve corporate and business goals and objectives
- The financing needs of the Group
- Financial control, use of financial resources, acquisitions and divestures and the monitoring and reporting thereon
- Governance structures, policies and procedures
- Value creation and alignment of Stakeholder relationships

## **Infrastructure**

Development of complex infrastructure is a key element in Mothercat Construction Company core competence. Countless bridges and road systems across Nigeria illustrate the durable quality of Mothercat Construction Company infrastructure works.

- MotherCat provides professional services in the areas of engineering, construction and maintenance of various infrastructures.
- MotherCat continues to build and expand essential traffic networks in and around its three key operational hubs: Abuja, Lagos and Uyo.
- The company is playing a major role in the realization of Abuja's master plan.
- In coastal areas MotherCat constructs turnkey harbors, wharfs, jetties, loading installations and warehouses.
- Airports that MotherCat builds or refurbishes conform to strict global aviation regulations.
- The company's sizeable fleet of specialized equipment enables efficient construction of large-scale projects.

### **Quality Culture**

The delivery of superior quality has always set MotherCat apart. Such proven leadership has been attained through the steadfast commitment to rigorous control and assessment of all policies and procedures.

- MotherCat's quality management system strictly conforms to requirements set by the Standards Organization of Nigeria (SON) and International Standards Organization (ISO).
- Quality is a fundamental aspect of Mothercat Construction Company corporate culture; training reinforces the specialized knowhow needed to guarantee sustained excellence.
- The company puts continual emphasis on research, development and innovation, across all operational areas, including production and procurement.

MotherCat has established production facilities and laboratories which ensure consistency in the quality and reliability of production and testing.

### Corporate Culture

MotherCat's progressive corporate culture sets forth the goals and principles that unite its employees and provides the foundation for continuous improvement in the value of services given to customers. MotherCat's success is based on the shared commitment of the men and women who define the company leadership, on developing new technologies and on discovering creative and innovative solutions to construction challenges.

MotherCat seeks excellence in all areas of the company's business and is committed to continuous enhancement and progress.

One way the company works to achieve this goal is through the long term education and training of employees, who are the building blocks of Mothercat Construction Company future. Strong teams are built on a shared drive for success, trust and genuine caring for one another. These teams are maintained through open communication and a transparent work environment.

It is the policy of MotherCat that there should be no discrimination in considering applications for employment. All employees are given equal opportunities to develop their experience and knowledge, and to qualify for promotion in furtherance of their careers.

### **1.9:1 Definition of Terms**

**Assessing:** this is the evaluation of value or cost of something.

**Impact:** this is a benefit derivable from something.

**Facilities:** these are the inputs such as equipment's, materials, machines and manpower use in production.

**Layout:** this is the arrangement or the configuration of departments, work centres, machines and equipments require for production.

**Productivity:** this is the ratio of output to input in terms of the efficiency of machines, equipments and labour.

**Product:** this is physical goods or services that satisfy consumers' needs.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter review the opinion of various authors, journals, books, magazines, etc on the subject matter. The study covered sub-headings, such as: Concept of plant layout, objective of plant layout, types of layout, factors to be consider for effective plant layout, plant location and site selection, factors affecting plant layout, production process, and types of production process.

#### **2.2 Concept of Plant Layout**

According to Frazelle (2016), “Layout identically involves the allocation of space and the arrangement of equipment in such a maimer that overall operating costs are minimized”. In the words of Meyers and Stephens (2015), “Plant layout is a floor plan for determining and arranging the designed machinery and equipment of a plant, whether established or

contemplated, in the best place, to permit the quickest flow of material, at the lowest cost and with the minimum handling in processing the product, from the receipt of raw material to the shipment of finished product”.

According to Russell (2017), “Plant layout is planning the path each component part of the product is to follow through the plant, coordinating the various parts so that the manufacturing processes may be carried out in the most economical manner, then preparing drawing or other representation of the arrangement and finally seeing that the plan is properly put into effect.” In the words of Mallick and Gandreau (2019), “It is planning the right equipment, coupled with right place, to permit the processing of a product unit in the most effective manner, through the shortest possible distance and in the shortest possible time.”

Plant layout is a mechanism which involves knowledge of the space requirements for the facilities and also involves their proper arrangement so that continuous and steady movement of the production cycle takes place. A plant layout study is an engineering study used to analyze different physical configurations for a manufacturing plant (Francis et al., 2012). Plant layout embraces the physical arrangement of industrial facilities. This arrangement, either installed or on plan, includes the space needed for material movement,

storage, indirect labour and all other supporting activities or services, as well as for office equipment and personnel (Back & Johansson, 2016):

Furthermore, according to Hofstrand (2016), plant Layout is the arrangement of machines, work areas and service areas within a factory. Hence, plant layout involves the development of physical relationship among building, equipment and production operations, which will enable the manufacturing process to be carried on efficiently. Plant layout is an arrangement of machines and facilities is layout. Plant layout can also be defined as a technique of locating machines, processes and plant services within the factory so as to achieve the greatest possible output of high quality at the lowest possible total cost of manufacturing (Spreigel & Lansburgh, 2018). Plant layout ideally involves the planning and integrating the paths of the component parts of a product to achieve the most effective and economic interrelationships between the operating equipment and personnel, the material movement, storage facilities, service functions and auxiliary equipment.

### **2.3 Objectives of Plant Layout**

Tompkins (2013) stated that if a layout is to fulfill the goal of an organization and to maximize production, it should be planned with the following objectives in mind:

1. **Economy in Materials Handling:** Economy in handling of materials, work-in- progress and finished stock.
2. **Optimum Utilization of Resources:** Ensuring optimum utilization of men, materials. equipment and space available.
3. **Better Inventory Control:** Minimizing work-in-process and maximizing inventory turnover. The material should move rapidly through the plant and the points of congestion should be eliminated to have low levels of inventory.
4. **Good Work Flow:** Minimizing chances of delay and eliminating bottlenecks in the production system. Ensure a good work-flow avoiding accumulation of work at vital points.
5. **Efficient Control:** Good plant layout ensures efficient supervision and production control in an organization.
6. **Avoidance of Changes:** Avoiding frequent changes so that production programme is not upset, causing the cost of production to rise.
7. **Safety:** Ensuring safety for the workers by eliminating or at least minimizing the chances of accidents.

8. **Better Services:** Providing adequate service centres at convenient locations.
9. **Higher Morale:** Boosting up employees morale by providing incentives and also comforts while at work.
10. **Flexibility:** Ensuring flexibility of layout for future changes and requirements.

The above objectives of plant layout are laudable in themselves, but it is often difficult to reconcile all of them in a practical situation. As such, a highest level of skill and judgement are required to be exercised by a management executive. To achieve this, a close coordination between him and the production manager is very essential (Tompkins, 2013).

## 2.4 Types of Layout

Plant layout is the physical arrangement of equipment and facilities within a plant. Optimizing the layout of a plant can improve productivity, safety and quality of products. Unnecessary efforts of materials handling can be avoided when the 'plant layout is optimized. Plant layout techniques apply to the case where several physical means have to be located in a certain area, either industrial processes or services. Spreigel and Lansburgh (2018) highlighted the following as the types of layout:

1. Process layout
2. Product layout
3. Cellular layout
4. Fixed position layout
5. Hybrid (mixed) layout

### **1. Process Layout**

- a) Used when the operations system must handle a wide variety of products in relatively small volumes (i.e, flexibility is necessary)
- b) Designed to facilitate processing items or providing services that present a variety of processing requirements.
- c) The layouts include departments or other functional groupings in which similar kinds of activities are performed.
- d) A manufacturing example of a process layout is the machine shop, which has separate departments for milling, grinding, drilling, and so on (Spreigel & Lansburgh, 2018).

### **2. Product (Assembly Line) Layout**

- a) Product layouts are used to achieve a smooth and rapid flow of large volumes of products or customers through a system.

- b) A job is divided into a series of standardized tasks, permitting specialization of both labor and equipment.
- c) The large volumes handled by these systems usually make it economical to invest huge amount of money in equipment and job design.
- d) Operations are arranged in the sequence required to make the product. For instance, if a portion of a manufacturing operation required the sequence of cutting, polishing, and painting, the appropriate pieces of equipment would be arranged in that sequence.
- e) Product layouts achieve a high degree of labor and equipment utilization (Spreigel & Lansburgh, 2018).

### **3. Cellular Manufacturing (CM) Layout**

- a) Cellular manufacturing is a type of layout in which machines are grouped into what is referred to as a cell.
- b) Groupings are determined by the operations needed to perform work for a set of similar items, or part families that require similar processing.

- c) Cellular layout provides faster processing time, less material handling, less work-in- process inventory, and reduced setup time.
- d) Used when the operations system must handle a moderate variety of products in moderate volumes (Spreigel & Lansburgh, 2018).

#### **4. Fixed-Position Layouts**

- a) In fixed-position layouts, the materials or major components remain in a fixed position, and workers, materials, and equipment are moved as needed.
- b) Fixed-position layout is used when product is very bulky, heavy or fragile
- c) Fixed-position layouts are widely used for farming, firefighting, road building, home building, remodeling and repair.
- d) Fixed-position layouts are used in large construction projects (buildings, power plants, and dams), shipbuilding, and production of large aircraft and space mission rockets (Spreigel & Lansburgh, 2018).

#### **5. Hybrid (Mixed) Layouts**

- a) Actually, most manufacturing facilities use a combination of layout types.
- b) An example of a hybrid layout is where departments are arranged according to the types of processes but the products flow through on a product layout.
- c) For instance, supermarket layouts are fundamentally of a process nature, and however we find most use fixed-path material-handling devices such as roller-type conveyors both in the stockroom and at checkouts, and belt-type conveyors at the cash registers.
- d) Hospitals also use the basic process arrangement, although frequently patient care involves more of a fixed-position approach, in which nurses, doctors, medicines, and special equipment are brought to the patient (Spreigel & Lansburgh, 2018).

## **2.5 Factors to be Consider for Effective Plant Layout**

According to Wiyaratn and Watanapa (2015), after the flow process diagrams are completed and before detailed piping, structural and electrical design can begin, the layout of process units in a plant and the equipment within these process unit must be planned. This layout can play an important part in determining construction and manufacturing costs, and thus must be

planned carefully with attention being given to future problems that may arise. Thus the economic construction and efficient operation of a process unit will depend on how well the plant and equipment specified on the process flow sheet is laid out. The principal factors that are considered are listed below:

- (i) **Costs:** The cost of construction can be minimized by adopting a layout that gives the shortest run of connecting pipe between equipment, and least amount of structural steel work. However, this will not necessarily be the best arrangement for operation and maintenance.
- (ii) **Process Requirements:** An example of the need to take into account process consideration is the need to elevate the base of columns to provide the necessary net positive suction head to a pump.
- (iii) **Convenience of Operation:** Equipment that needs to have frequent attention should be located convenient to the control room. Valves, sample points, and instruments should be located at convenient positions and heights. Sufficient working space and headroom must be provided to allow easy access to equipment (Wiyaratn & Watanapa, 2015).

- (iv) **Convenience of Maintenance:** Heat exchangers need to be sited so that the tube bundles can be easily withdrawn for cleaning and tube replacement. Vessels that 2.5 Factors to be Consider for Effective Plant Layout

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- (iv) **Convenience of Maintenance:** Heat exchangers need to be sited so that the tube bundles can be easily withdrawn for cleaning and tube replacement. Vessels that require frequent replacement of catalyst or packing should be located on the outside of buildings. Equipment that requires dismantling for maintenance, such as compressors and large pumps, should be placed under cover.
- (v) **Health and Safety Considerations:** Blast walls may be needed to isolate potentially hazardous equipment, and confine the effects of an explosion. At least two escape routes for operators must be provided from each level in process buildings.

- (vi) **Future Plant Expansion:** Equipment should be located so that it can be conveniently tied in with any future expansion of the process. Space should be left on pipe alleys for future needs, and service pipes over-sized to allow for future requirements (Wiyaratn & Watanapa, 2015).
- (vii) **Modular Construction:** In recent years there has been a move to assemble sections of plant at the plant manufacturer's site. These modules will include the equipment, structural steel, piping and instrumentation. The modules are then transported to the plant site, by road or sea. The advantages of modular construction are:
- (a) Improved quality control.
  - (b) Reduced construction cost.
  - (c) Less need for skilled labors on site.

## 2.6 Plant Location and Site Selection

The geographical location of the final plant can have strong influence on the success of the industrial venture. Considerable care must be exercised in selecting the plant site, and many different factors must be considered. Primarily the plant must be located where the minimum cost of production and distribution can be obtained but, other factors such as room for

expansion and safe living conditions for plant operation as well as the surrounding community are also important (Back & Johansson, 2016). Mallick and Gandreau (2019) stated that the location of the plant can also have a crucial effect on the profitability of a project. The choice of the final site should first be based on a complete survey of the advantages and disadvantages of various geographical areas and ultimately, on the advantages and disadvantages of the available real estate. The various principal factors that must be considered while selecting a suitable plant site are briefly discussed in this section as given by Mallick and Gandreau (2019). The factors to be considered are:

1. **Raw Materials Availability:** The source of raw materials is one of the most important factors influencing the selection of a plant site. This is particularly true for the sulfuric acid plant because large volumes of sulfur are consumed in the process which will result in the reduction of the transportation and storage charges. Attention should be given to the purchased price of the raw materials, distance from the source of supply, freight and transportation expenses, availability and reliability of supply, purity of raw materials and storage requirements.

2. **Location:** The location of markets or intermediate distribution centers affects the cost of product distribution and time required for shipping. Proximity to the major markets is an important consideration in the selection of the plant site, because the buyer usually finds advantageous to purchase from near-by sources. In case of sulfuric acid plant, the major consumers are fertilizer industries and hence the plant should be erected in close proximity to those units (Mallick & Gandreau, 2019).
  
3. **Availability of Suitable Land:** The characteristics of the land at the proposed plant site should be examined carefully. The topography of the tract of land structure must be considered, since either or both may have a pronounced effect on the construction costs. The cost of the land is important, as well as local building costs and living conditions. Future changes may make it desirable or necessary to expand the plant facilities. The land should be ideally flat, well drained and have load-bearing characteristics. A full site evaluation should be made to determine the need for piling or other special foundations.
  
4. **Transport:** The transport of materials and products to and from plant will be an overriding consideration in site selection. If practicable, a

site should be selected so that it is close to at least two major forms of transport: road, rail, waterway or a seaport. Road transport is being increasingly used, and is suitable for local distribution from a central warehouse. Rail transport will be cheaper for the long- distance transport. If possible the plant site should have access to all three types of transportation. There is usually need for convenient rail and air transportation facilities between the plant and the main company headquarters, and the effective transportation facilities for the plant personnel are necessary.

- 5. Availability of Labours:** Labors will be needed for construction of the plant and its operation. Skilled construction workers will usually be brought in from outside the site, but there should be an adequate pool of unskilled labors available locally: and labors suitable for training to operate the plant. Skilled tradesmen will be needed for plant maintenance. Local trade union customs and restrictive practices will have to be considered when assessing the availability and suitability of the labors for recruitment and training (Mallick & Gandreau, 2019).

**6. Availability of Utilities:** The word “utilities” is generally used for the ancillary services needed in the operation of any production process. These services will normally be supplied from a central facility and includes Water, Fuel and Electricity which are briefly described as follows:

**(i) Water:** The water is required for large industrial as well as general purposes, starting with water for cooling, washing, steam generation and as a raw material in the production of sulfuric acid. The plant therefore must be located where a dependable water supply is available namely lakes, rivers, wells, seas. If the water supply shows seasonal fluctuations, it’s desirable to construct a reservoir or to drill several standby wells. The temperature, mineral content, slit and sand content, bacteriological content, and cost for supply and purification treatment must also be considered when choosing a water supply. Demineralized water, from which all the minerals have been removed is used where pure water is needed for the process use, in boiler feed. Natural and forced draft cooling towers are generally used to provide the cooling water require on site.

(ii) **Electricity:** Power and steam requirements are high in most industrial plants and fuel is ordinarily required to supply these utilities. Power, fuel and steam are required for running the various equipments like generators, motors, turbines, plant lightings and general use and thus be considered as one major factor is choice of plant site (Mallick & Gandreau, 2019).

7. **Environmental Impact and Effluent Disposal:** Facilities must be provided for the effective disposal of the effluent without any public nuisance. In choosing a plant site, the permissible tolerance levels for various effluents should be considered and attention should be given to potential requirements for additional waste treatment facilities. As all industrial processes produce waste products, full consideration must be given to the difficulties and cost of their disposal. The disposal of toxic and harmful effluents will be covered by local regulations, and the appropriate authorities must be consulted during the initial site survey to determine the standards that must be met.

8. **Local Community Considerations:** The proposed plant must fit in with and be acceptable to the local community. Full consideration must be given to the safe location of the plant so that it does not

impose a significant additional risk to the community (Mallick & Gandreau, 2019).

- 9. Climate:** Adverse climatic conditions at site will increase costs. Extremes of low temperatures will require the provision of additional insulation and special heating for equipment and piping. Similarly, excessive humidity and hot temperatures pose serious problems and must be considered for selecting a site for the plant. Stronger structures will be needed at locations subject to high wind loads or earthquakes.
- 10. Political and Strategic Considerations:** Capital grants, tax concessions, and other inducements are often given by governments to direct new investment to preferred locations; such as areas of high unemployment. The availability of such grants can be the overriding consideration in site selection.
- 11. Taxation and Legal Restrictions:** State and local tax rates on property income, unemployment insurance, and similar items vary from one location to another. Similarly, local regulations on zoning, building codes, nuisance aspects and others facilities can have a major

influence on the final choice of the plant site (Mallick & Gandreau, 2019).

## 2.7 Factors Affecting Plant Layout

The final solution for a plant layout has to take into account a balance among the characteristics and considerations of all factors affecting plant layout, in order to get the maximum advantages. According to Tompkins (2013), the factors affecting plant layout can be grouped into 8 categories:

1. **Materials:** The layout of the productive equipment will depend on the characteristics of the product to be managed at the facility, as well as the different parts and materials to work on. Main factors to be considered: size, shape, volume, weight, and the physical-chemical characteristics, since they influence the manufacturing methods and storage and material handling processes. The sequence and order of the operations will affect plant layout as well, taking into account the variety and quantity to produce (Tompkins, 2013).
2. **Machinery:** Having information about the processes, machinery, tools and necessary equipment, as well as their use and requirements is essential to design a correct layout. The methods and time studies to improve the processes are closely linked to the plant layout. Regarding machinery, we have to consider the type, total available for each type, as well as type and quantity of tools and equipment. It's

essential as well to know about space required, shape, height, weight, quantity and type of workers required, risks for the personnel, requirements of auxiliary services, etc.

3. **Labour:** Labor has to be organized in the production process (direct labor, supervision). Environment considerations are employees' safety, light conditions, ventilation, temperature, noise, etc. Process considerations are personnel qualifications, flexibility, number of workers required at a given time as well as the type of work to be performed by them (Tompkins, 2013).
4. **Material - Handling:** Material handling does not add value to the product; it's just waste. Objectives are to minimize material handling as well as combining with other operations when possible, eliminating unnecessary and costly movements.
5. **Waiting Time — Stock:** Continuous material flow through the facility, avoiding the cost of waiting time and demurrages that happen when the flow stops. On the other hand, the material waiting to flow through the facility not always represents a cost to avoid. As stock sometimes provides safety to protect production, improving customer service, allowing more economic batches, etc. It's necessary then to

consider space for the required stock at the facility when designing the layout (Tompkins, 2013).

## **2.8 Production Process**

Production is a process of transforming (converting) inputs (raw-materials) into outputs (finished goods). So, production means the creation of goods and services. It is done to satisfy human wants. Thus, production is a process of transformation. Production is a process of combining various material inputs and immaterial inputs (plans, know-how) in order to make something for consumption (the output). It is the act of creating output, a good or service which has value and contributes to the utility of individuals. Production is the process that creates a product. A product, that is the outcome of production, is a valuable commodity or service (McKay & Wiers, 2014). Production can be whereby factors of production (land, labour, capital and enterprise) are used to convert raw material into goods. The production of services may only involve labour /capital, example, massage services.'

## 2.9 Types of Production Process

According to Narasimhan, McLeavey and Billington (2017), some of the most important types of production are:

- (i) Job Production
- (ii) Batch production and
- (iii) Mass or flow production

A production manager will have to choose most appropriate method for his enterprise. The final decision regarding any particular method of production is very much affected by the nature of the products and the quantity to be produced. Production methods may be broadly classified as Job Production, Batch production and Mass or Flow Production.

### **A) Job Production:**

Under this method peculiar, special or non-standardized products are produced in accordance with the orders received from the customers. As each product is nonstandardized varying in size and nature, it requires separate job for production. The machines and equipment's are adjusted in such a manner so as to suit the requirements of a particular job. Job production involves intermittent process as the work is carried as and when the order is received. It consists of bringing together of material, parts and

components in order to assemble and commission a single piece of equipment or product. Ship building, dam construction, bridge building, book printing are some of the examples of job production. Third method of plant layout viz., Stationery Material Layout is suitable for job production (Narasimhan, McLeavey & Billington, 2017).

### **Characteristics of Job Production**

The job production possesses the following characteristics.

1. A large number of general purpose machines are required.
2. A large number of workers conversant with different jobs will have to be employed.
3. There can be some variations in production.
4. Some flexibility in financing is required because of variations in work load.
5. A large inventory of materials, parts and tools will be required.
6. The machines and equipment setting will have to be adjusted and readjusted to the manufacturing requirements.
7. The movement of materials through the process is intermittent.

### **B) Batch Production:**

Batch production pertains to repetitive production. It refers to the production of goods, the quantity of which is known in advance. It is that form of production where identical products are produced in batches on the basis of demand of customers' or of expected demand for products. This method is generally similar to job production except the quantity of production. Instead of making one single product as in case of job production, a batch or group of products are produced at one time. It should be remembered here that one batch of products may not resemble with the next batch. Under batch system of production the work is divided into operations and one operation is done at a time. After completing the work on one operation it is passed on to the second operation and so on till the product is completed (Narasimhan, McLeavey & Billington, 2017).

**C) Mass or Flow Production:**

This method involves a continuous production of standardized products on a large scale. Under this method, production remains continuous in anticipation of future demand. Standardization is the basis of mass production. Standardized products are produced under this method by using standardized materials and equipment. There is a continuous or uninterrupted flow of production obtained by arranging the machines in a proper sequence of operations. Process layout is best suited method for mass

production units. Flow production is the manufacture of a product by a series of operations, each article going on to a succeeding operation as soon as possible. The manufacturing process is broken into separate operations. The product completed at one operation is automatically passed on to the next till its completion. There is no time gap between the work done at one process and the starting at the next. The flow of production is continuous and progressive (Narasimhan, McLeavey & Billington, 2017).

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Research Design**

Research design is an important tool for the collection of reliable data for study. In order to achieve high reliability and validity in this research study, the survey research is considered appropriate for this study. Survey research is a scientific research method that is interested in generating current data and information on the varieties under investigation. This method has important advantage of providing reliable assessment of the sample population, in terms of its characteristics, problems and other variables being investigated.

#### **3.2 Research Population**

The population of the study refers to the total number of staff in MotherCat Construction Company, the size of the population of the company is one hundred (100), which comprises of 30 management staff and 70 junior staff.

#### **3.3 Sample Size and Sampling Techniques**

Sampling is the act of reducing a population to researchable order. However, the researcher decided to use Krejcie and Morgan Sample Size Determination table (1970).

Therefore, the researcher used the sample of eighty (80) employees and to which questionnaire will be administered. The questionnaires allow the researcher to obtain data on the feeling and perception of the sample size. The sample techniques employed is the random sample technique; the random sample is a selection procedure where by the entire subject in a given population has an equal opportunity or chance of being selected for the research study as propounded by Sambo (2005). Basically, the reason of chosen the random sampling is to select a sample that will produce research data that can be used to generalize a larger population.

### **3.4 Method Used for Gathering Data**

The researcher used the field survey method of gathering data employing the use of questionnaire and oral interview. Therefore the researcher personally administered the questionnaire and also conducted the interview himself, the questionnaires were delivered by hand and also collected by hand. Secondary methods of gathering data is also used e.g. textbook, journal, etc.

### 3.5 Justification for the Instrument Used

Questionnaire is used for the best form of getting data and their consistency in the research work. And also is the simplest way of gathering specific information about a problem under investigation.

### 3.6 Method of Data Analysis

The procedures for the method of analysis of the data have been divided into two parts; data presentation and content analysis. The statistical tool to be used in testing the hypotheses is the Chi-Square analysis. The principle behind the Chi-Square test is that an observed set of values differs significantly from some expected or theoretical frequencies.

F = Total number of frequencies

N = Total number of respondents

Inferential statistics like chi-square is used in testing the hypothesis  $X^2$ .

$$\text{Chi-square formular } X^2 = \sum \frac{(O - E)^2}{E}$$

O = Observed frequency

E = Expected frequency

$\sum$  = summation

$\chi^2 = \text{Chi-Square}$

### **3.7 Justification for the Method Used**

The statistical instrument use in analyzing the data collected is Chi-Square ( $X^2$ ), the techniques is more appropriate and convenience to the researcher and to enable the reader comprehend the research findings.

## **CHAPTER FOUR**

### **DATA PRESENTATION AND ANALYSIS**

This chapter is a detailed presentation of results discussion and analysis of data collected for this study. The researcher used tables for the analysis of the data collected during the study.

The researcher administers (80) questionnaires and all were completed and returned to the researcher. The returned questionnaires formed the basis for the analysis and the presentation of results.

#### 4.1 Data Presentation and analysis

Question 1: .What type of production planning is facilities layout?

**Table 4.1.1:**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Long term	20	25%
Short term	-	-
All of the above	60	75
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 20 respondents out of 80 respondents, representing 25% agreed that the production planning type is long-term while 60 respondents representing 76% agreed that the production planning type is all of the above (long-term and short term).

**Question 2:** Which type of the following facilities layout do you use for production?

**Table 4.2**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
------------------	------------------	-----------------------

Process layout	15	18.75%
Product layout	50	62.5%
All of the above	15	18.75%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 15 respondents representing 18.75% are of the opinion that the organization uses process layout, 50 respondents representing 62.5% responded that the organization uses product layout while 15 respondents representing 18.75% said fixed layout.

**Question 3:** What are the factors that determine your type of facilities layout?

**Table 4.3**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
The volume of production	40	50%
The nature of the service	-	-
The weight of the item	-	-

The cost of the building for operation	20	25%
The product mix that must share a facility	20	25%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 40 respondents representing 50% responded that the factor is volume of production, 20 respondents representing 25% responded to cost of the building for operation while 20 respondents representing another 25% responded to product mix that must share a facility respectively.

**Question 4:** Is your organization responsible for the arrangement of the product layout for production?

**Table 4.4**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	60	75%
No	20	25%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60 respondents representing 75% responded to the organization responsibility for arrangement of product layout for production, 20 respondents representing 25% disagreed with the option 'No'.

**Question 5:** What production process does your company use for production?

**Table 4.5**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Continuous process	60	75%
Intermittent process	20	25%
All of the above	-	25
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60 respondents representing 75% responded to continuous process while 20 respondent representing 25% responded to intermittent process.

**Question 6:** Is product layout type of necessary in the production of standardized product?

**Table 4.6**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	80	100%
No	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 80 respondents representing 100% responded with ‘yes’ option, that product layout is necessary in the production of standardized product.

**Question 7:** What are the challenges facing your company today?

**Table 4.7**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Power supply	15	18.75%
Inadequate machines accessories	15	18.75%

Human factor	-	-
Economic instability	-	-
All of the above	50	75%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 50 respondents representing 75% responded that all of the challenges are faced by the company, 15 respondents representing 18.75% responded to power supply while another 15 respondents representing 18.75% responded to inadequate machines accessories.

**Question 8:** Is the product layout type having positive effect on operational costs ?

**Table 4.8**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	60	75
No	20	25
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60 respondents representing 75% responded that product layout has positive effect on operational costs while 20 respondents representing 25% responded that product layout does not have positive effect on operational costs.

**Question 9:** Is product layout type enhancing production capacity in your company?

**Table 4.9**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	80	100%
No	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 80 respondents representing 100% responded that the product layout type is enhancing production capacity.

## **SECTION B: MIDDLE MANAGEMENT QUESTIONNAIRE**

**Question 4.10:** What section is responsible for product layout in your organization?

**Table 4.10**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Marketing section	-	-
Production section	80	100%
Purchasing section	-	-
Personnel section	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 80 respondents representing 100% responded that the section responsible for product layout is production section.

**Question 4.11:** Who are these in charge of the operation of machines and equipments?

**Table 4.11**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Engineers	60	75%
Maintenance workers	20	25%
Foremen	-	-
Supervisors	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60 respondents representing 75% responded to engineers are those responsible for the operation of machines and equipments while 20 respondents representing 25% responded to maintenance workers.

**Question 4.12:** Do you experience machines break-down?

**Table 4.12**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	60	75%
No	20	25%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60% respondents representing 75% responded that they experienced machine breakdown while 20 responded that they do not experience machine breakdown.

**Question 4.13:** How often do you replace the machines and equipments accessories?

**Table 4.13**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Every day	-	-
Every week	20	25%
Every month	80	75%
All of the above	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60% respondents representing 75% responded that every month both machines and equipments accessories are replaced while 20 respondents representing 25% responded to every week.

**Question 4.14:** Does product layout enhances operational costs?

**Table 4.14**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	60	75%
No	20	25%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60% respondents representing 75% responded that product layout enhances operational cost while 20 respondents representing 25% responded that product layout doesn't enhance operational cost.

**Question 4.15:** Does product layout enhances productivity?

**Table 4.15**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	60	75%

No	20	25%
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60% respondents representing 75% responded that product layout enhances productivity while 20 respondents representing 25% responded that product layout doesn't enhance productivity.

**Question 4.16:** To what extent does product layout increases production volume?

**Table 4.16**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
To a greater extent	60	75%
To a lesser extent	20	25%
Not at all	—	-
No comment	-	-
<b>Total</b>	<b>80</b>	<b>100</b>

*Source:* Field study, 2022.

From the above table 60% respondents representing 75% responded that product layout enhances productivity while 20 respondents representing 25% responded that product layout doesn't enhance productivity.

### 4.3 Test of Hypothesis

For the purpose of this study, the following hypothesis formulated in chapter one are tested in this section.

Ho: Facilities layout does not have impact on organizational productivity.

Hi: Facilities layout has impact on organizational productivity.

Table 6, 14 and 18 will be used to test the hypothesis above level of confidence is 0.05 level of significance, this means that the error term  $\alpha = 5\%$

It implies that the study allows a 5% chance of conclusion being corrected

Degree of freedom of  $(df) = (r - 1) (c - 1)$ .

Testing statistic

$$X^2 = \sum \frac{(O - E)^2}{E}$$

**Decision Rule:** Accept  $H_1$  if  $X^2 >$  critical value of  $X^2$

Degree of freedom of below table =  $(r - 1) (c - 1)$

$$= (3 - 1) (2 - 1)$$

$$= 2 \times 1$$

$$= 2$$

### CONTINGENCY TABLE

S/N	Questions	Favourable	Unfavourable	Total
6	Is product layout type necessary in the production of standardized product?	80 (66.7)	0 (13.3)	80
14	Does product layout enhance operational cost?	60 (66.7)	20 (13.3)	80
16	To what extent does product layout increases production volume?	60 (66.7)	20 (13.3)	80

### COMPUTATION

Key: O = observed frequency

E = Expected frequency

### COMPUTATION OF CHI-SQUARE $X^2$

O	E	O-E	$(O-E)^2$	$\Sigma(O-E)^2$

80	66.7	13.3	176.89	2.65
80	66.7	6.7	44.89	0.67
60	66.7	6.7	44.89	0.67
0	13.3	13.3	176.86	13.3
20	13.3	6.7	44.89	3.38
20	13.3	6.7	44.89	3.38

Source: Author's computation

Decision Rule: Since the computed  $X^2 = 24.05$  which is greater than the critical  $X^2$  table value = 5.991. Therefore, we accept  $H_1$  which states that facilities layout has impact on organizational productivity while  $H_0$  is rejected that is facilities layout does not have impact on organizational productivity.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter summarizes the findings of this study, draws conclusion and make recommendations.

#### **5.1 Summary**

In summary, the research study which placed more emphasis on facilities layout, its impact and how it enhances organizational productivity with particular reference to MotherCat Nigeria Limited has put to test the relevant hypothesis developed. The test carried out is supportive of H1 i.e. hypothesis (alternative) which states that facilities layout has impact on organizational productivity in manufacturing sector.

On the other hand, the test has rejected Null hypothesis (Ho) which states that: facilities layout does not have impact on organizational productivity in manufacturing sector.

In this respect, management should therefore, with all vigour, study the recommendations put forward for acceptance, as this was done to ensure adoption of the necessary facilities layout and improve on the one being applied to generally enhance the production of standardized product and quality product in the organization, minimizes operational costs and maximizes production volume. With this, the contribution of product layout towards attaining the corporate objectives of the organization will be positive outstanding. It is not enough to have facilities layout objective stated, but the optimal utilization of facilities therein is of prime important to the survival of the organization. In other word, for the organization to achieve overall organizational and production objectives, effective facilities layout must be designed and re-designed.

In MotherCat Nigeria Limited, which is my case study, effective product layout designed determines the product standard and quality against its competitor.

## **5.2 Conclusion**

In the previous chapters, I have come to realize that the impact of facilities layout in any manufacturing organization cannot be over emphasized.

It is worthy of note that corner stone for growth and expansion of organization particularly manufacturing is its facilities layout objective.

Thus, the entire organizational production objective will not be achievable without effective facilities layout objective clearly and properly stated and incorporated into the mainstream of the organization's objectives.

In the course of my research study, I discovered also that the general working environment is not very conducive due to the excessive noise of machines used for production and the heat generated by these machines facilitates the movement of workers and as such interrupt production cycle which affect the production volume. The environment also requires constant power supply for efficiency and effectiveness in the entire production system.

### **5.3 Recommendations**

Having observed and diagnosed some of the problems affecting the organization, therefore, the researcher put forward the following recommendations:

1. **Automated machines:** MotherCat Nigeria Limited should adopt automated machines use in enhancing productivity and production costs. This will enhance production activities because low labour requirement will minimize operational costs and as such the machines capacity will increase production volume because of the organization competitive business environment. Also, modern materials handling equipments should be used to allow efficient handling and movement of semi-finished and finished products.
2. **Outstanding of power** MotherCat Nigeria Limited should improve and increase the outsourcing of power for constant power supply in order to enhance production since some of the machines require power for efficient production in this competitive environment. This will facilitate the organizational objective in meeting customers and consumers; needs. Also, this is very vital because some of the facilities for production require power to function.
3. **Re-designed of facilities layout:** MotherCat Nigeria Limited should re-designed its facilities layout as customers' needs changes in the business environment. The business environment in which this company operates is challenging and at the same time competitive. So, for the company to satisfy its customers and to meet up with the challenges there is need for

the organization to be operating base on what the customers wants or needs which will require re-design of facilities layout to meet these needs. And this will lead to the attainment of organizational objective.

4. **Conducive operative environment:** Base on the enumerated problem above, I also recommend that machines design should be such that operate less heat so as to facilitate the installation of central cooling system which will enhance productivity. And less noisy machines should be adopted for use in future expansion programmes. This of course will pave way for absolute concentration and production improvement.
5. Training and re-orientation programme: It will be very significant for the organization to establish periodic training workshops and seminars for machines operators and supervisors. Also, the re-orientation of workers so that they will be more acquainted and familiar with the use of machines and equipments which will enhance their performance i.e. labour efficiency and minimize operational cost to the organization.

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## **APPENDIX I**

College of Business and Management Studies,  
Department of Management Studies,  
P.M.B 2113,  
Kaduna Polytechnic,  
Kaduna.

26<sup>th</sup> January, 2022.

MotherCat Construction Company  
Kaduna.

Dear Sir/madam,

### **LETTER OF INTRODUCTION**

I am a Higher National Diploma Student in Production and Operations Management of the above named Institution and will be delighted if you can tick the appropriate answers to the following questionnaires.

Please be informed that any information released to me shall be used only for Academic Purpose.

Thank you for your anticipated assistance and cooperation.

Yours faithfully,

Luke Etafia

## **APPENDIX II**

### **QUESTIONNAIRE**

This questionnaire is designed to Assess the Impact of Facilities Layout for Enhancing Organizational Productivity using Mothercat Construction Company Kaduna as a case Study. The questionnaire covers all the areas which the researcher feels are relevant to the research work.

Please tick the appropriate option.

1. What type of production planning is facilities layout?
  - a. Long-term [ ]
  - b. Short-term [ ]
  - c. All of the above [ ]
  
2. Which type of the following facilities layout do you use for production?
  - a. Process layout [ ]
  - b. Product layout [ ]
  - c. Fixed layout [ ]
  
3. What is the factor that determines your type of facilities layout?
  - a. The volume of production [ ]
  - b. The nature of the service [ ]
  - c. The weight of the item [ ]
  - d. The cost of the building for operation [ ]
  - e. The product mix that must share a facility [ ]
  
4. Is your organization responsible for the arrangement of the product layout for production?
  - a. Yes [ ]
  - b. No [ ]
  
5. What production process does your Company use for production?

a. Continuous Process [ ]

b. Intermittent Process [ ]

c. All of the above [ ]

6. Is product layout type necessary in the production of standardized product?

a. Yes [ ] b. No [ ]

7. What are the challenges facing your Company today?

a. Power Supply [ ]

b. Inadequate machines accessories [ ]

c. Human factor [ ]

d. Economic instability [ ]

e. All of the above [ ]

8. Is the product layout type having positive effect on operational costs?

a. Yes [ ] b. No [ ]

9. Is product layout type enhancing production capacity in your Company?

a. Yes [ ] b. No [ ]

10. What section is responsible for product layout in your organization?
- a. Marketing section [ ]    b. Production section [ ]
- c. Purchasing section [ ]    d. Personnel section [ ]
11. Who are those in charge of the operation of machines and equipments?
- a. Engineers [ ]    b. Maintenance workers [ ]
- c. Foremen [ ]    d. Supervisors [ ]
12. Do you experience machines breakdown?
- a. Yes [ ]    b. No [ ]
13. How often do you replace machines and equipments accessories?
- a. Every day [ ]    b. Every week [ ]
- c. Every month [ ]    d. All of the above [ ]
14. Does product layout enhances operational costs?
- a. Yes [ ]    b. No [ ]
15. Does product layout enhances productivity?
- a. Yes [ ]    b. No [ ]

16. What type of facilities layout do you adopt?

a. Product layout [ ]                      b. Process layout [ ]

c. Fixed layout [ ]                      d. All of the above [ ]

17. To what extent does product layout enhances your performance?

a. To a greater extent [ ]                      b. To a lesser extent [ ]

c. Not at all [ ]                      d. No comment [ ]

18. To what extent does product layout increases production volume?

a. Yes [ ]                      b. No [ ]

19. How often do you service machines and equipments?

a. Every day [ ]                      b. Every week [ ]

c. Every month [ ]                      d. All of the above [ ]

20. Is product layout arrangement very effective?

a. Very effective [ ]                      b. Effective [ ]

c. Fairly effective [ ]                      d. Not effective [ ]

