## Sengamala Thayaar Educational Trust Women’s College

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**FOOD SERVICE FACILITY**

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**Facility Layout - Objectives, Design and Factors Affecting the Layout**

### Introduction

For an organization to have an effective and efficient manufacturing unit, it is important that special attention is given to facility layout. Facility layout is an arrangement of different aspects of manufacturing in an appropriate manner as to achieve desired production results. Facility layout considers available space, final product, safety of users and facility and convenience of operations.

An effective facility layout ensures that there is a smooth and steady flow of production material, equipment and manpower at minimum cost. Facility layout looks at physical allocation of space for economic activity in the plant. Therefore, main objective of the facility layout planning is to design effective workflow as to make equipment and workers more productive.

### Facility Layout Objective

A model facility layout should be able to provide an ideal relationship between raw material, equipment, manpower and final product at minimal cost under safe and comfortable environment. An efficient and effective facility layout can cover following objectives:

* To provide optimum space to organize equipment and facilitate movement of goods and to create safe and comfortable work environment.
* To promote order in production towards a single objective
* To reduce movement of workers, raw material and equipment
* To promote safety of plant as well as its workers
* To facilitate extension or change in the layout to accommodate new product line or technology upgradation
* To increase production capacity of the organization

An organization can achieve the above-mentioned objective by ensuring the following:

* Better training of the workers and supervisors.
* Creating awareness about of health hazard and safety standards
* Optimum utilization of workforce and equipment
* Encouraging empowerment and reducing administrative and other indirect work

### Factors affecting Facility Layout

Facility layout designing and implementation is influenced by various factors. These factors vary from industry to industry but influence facility layout. These factors are as follows:

* The design of the facility layout should consider overall objectives set by the organization.
* Optimum space needs to be allocated for process and technology.
* A proper safety measure as to avoid mishaps.
* Overall management policies and future direction of the organization

### Design of Facility Layout

Principles which drive design of the facility layout need to take into the consideration objective of facility layout, factors influencing facility layout and constraints of facility layout. These principles are as follows:

* **Flexibility:** Facility layout should provide flexibility for expansion or modification.
* **Space Utilization:** Optimum space utilization reduces the time in material and people movement and promotes safety.
* **Capital:** Capital investment should be minimal when finalizing different models of facility layout.

### Design Layout Techniques

There are three techniques of design layout, and they are as follows:

1. **Two or Three Dimensional Templates:** This technique utilizes development of a scaled-down model based on approved drawings.
2. **Sequence Analysis:** This technique utilizes computer technology in designing the facility layout by sequencing out all activities and then arranging them in circular or in a straight line.
3. **Line Balancing:** This kind of technique is used for assembly line.

### Types of Facility Layout

There are six types of facility layout, and they are as follows:

* Line Layout
* Functional Layout
* Fixed Position Layout
* Cellular Technology Layout
* Combined Layout, and
* Computerized Relative Allocation of Facility Technique

# Demand Forecasting - Objectives, Classification and Characteristics of a Good Forecast

### Forecasting

For an organization to provide customer delight it is important that organization can understand what customer wants and how much does they want. If an organization can gauge future demand that manufacturing plan becomes simpler and cost effective.

The process of analyzing and understanding current and past information to understand the future patterns through a scientific and systemic approach is called forecasting. And **the process of estimating the future demand of product in terms of a unit or monetary value is referred to as demand forecasting**.

The purpose of forecasting is to help the organization manage the present as to prepare for the future by examining the most probable future demand pattern. However, forecasting has its constraint for example we cannot estimate a pattern for technologies and product where there are no existing pattern or data.

### Business Forecasting Objective

The very objective of business forecasting is to be accurate as possible, so that planning of resources can be done in a very economical manner and therefore, propagate optimum utilization of resources. Business forecasting helps in establishing relationship among many variables, which go into manufacturing of the product. Each forecast situation must be analyzed independently along with forecasting method.

### Classification of Business Forecasting

Business forecasting has many dimensions and varieties depending upon the utility and application. The three basic forms are as follows:

**Economic Forecasting:** these forecasting are related to the broader macro-economic and micro-economic factors prevailing in the current business environment. It includes forecasting of inflation rate, interest rate, GDP, etc. at the macro level and working of particular industry at the micro level.

**Demand Forecast:** organization conduct analysis on its pre-existing database or conduct market survey as to understand and predict future demands. Operational planning is done based on demand forecasting.

**Technology Forecast:** this type of forecast is used to forecast future technology upgradation.

### Timeline of Business Forecasting

A forecast and its conclusion are valid within specific time frame or horizon. These time horizons are categorized as follows:

**Long Term Forecast:** This type of forecast is made for a time frame of more than three years. These types of forecast are utilized for long-term strategic planning in terms of capacity planning, expansion planning, etc.

**Mid-Term Forecast:** This type of forecast is made for a time frame from three months to three years. These types of forecasts are utilized production and layout planning, sales and marketing planning, cash budget planning and capital budget planning.

**Short Term Forecast:** This type of forecast is made of a time frame from one day to three months. These types of forecasts are utilized for day to day production planning, inventory planning, workforce application planning, etc.

### Characteristics of Good Forecast

A good forecast is should provide sufficient time with a fair degree of accuracy and reliability to prepare for future demand. A good forecast should be simple to understand and provide information relevant to production (e.g. units, etc.)

### Forecasting Methods

Forecasting is divided into two broad categories, techniques and routes. Techniques are further classified into quantitative techniques and qualitative techniques. Quantitative techniques comprise of time series method, regression analysis, etc., where as qualitative methods comprise of Delphi method, expert judgment.

Routes forecasting consist of top-down route and bottom-up route.

# Capacity Planning

The production system design planning considers input requirements, conversion process and output. After considering the forecast and long-term planning organization should undertake capacity planning.

Capacity is defined as the ability to achieve, store or produce. **For an organization, capacity would be the ability of a given system to produce output within the specific time period**. In operations, management capacity is referred as an amount of the input resources available to produce relative output over period of time.

In general, terms capacity is referred as maximum production capacity, which can be attained within a normal working schedule.

Capacity planning is essential to be determining optimum utilization of resource and plays an important role decision-making process, for example, extension of existing operations, modification to product lines, starting new products, etc.

### Strategic Capacity Planning

A technique used to identify and measure overall capacity of production is referred to as strategic capacity planning. Strategic capacity planning is utilized for capital intensive resource like plant, machinery, labor, etc.

Strategic capacity planning is essential as it helps the organization in meeting the future requirements of the organization. Planning ensures that operating cost are maintained at a minimum possible level without affecting the quality. It ensures the organization remain competitive and can achieve the long-term growth plan.

### Capacity Planning Classification

Capacity planning based on the timeline is classified into three main categories long range, medium range and short range.

**Long Term Capacity:** Long range capacity of an organization is dependent on various other capacities like design capacity, production capacity, sustainable capacity and effective capacity. Design capacity is the maximum output possible as indicated by equipment manufacturer under ideal working condition.

Production capacity is the maximum output possible from equipment under normal working condition or day.

Sustainable capacity is the maximum production level achievable in realistic work condition and considering normal machine breakdown, maintenance, etc.

Effective capacity is the optimum production level under pre-defined job and work-schedules, normal machine breakdown, maintenance, etc.

**Medium Term Capacity:** The strategic capacity planning undertaken by organization for 2 to 3 years of a time frame is referred to as medium term capacity planning.

**Short Term Capacity:** The strategic planning undertaken by organization for a daily weekly or quarterly time frame is referred to as short term capacity planning.

### Goal of Capacity Planning

The ultimate goal of capacity planning is to meet the current and future level of the requirement at a minimal wastage. The three types of capacity planning based on goal are lead capacity planning, lag strategy planning and match strategy planning.

### Factors Affecting Capacity Planning

Effective capacity planning is dependent upon factors like production facility (layout, design, and location), product line or matrix, production technology, human capital (job design, compensation), operational structure (scheduling, quality assurance) and external structure ( policy, safety regulations)

### Forecasting v/s Capacity Planning

There would be a scenario where capacity planning done on a basis of forecasting may not exactly match. For example, there could be a scenario where demand is more than production capacity; in this situation, a company needs to fulfill its requirement by buying from outside. If demand is equal to production capacity; company is in a position to use its production capacity to the fullest. If the demand is less than the production capacity, company can choose to reduce the production or share it output with other manufacturers.

# What is Aggregate Planning ? - Importance and its Strategies

### Introduction

An organization can finalize its business plans on the recommendation of demand forecast. Once business plans are ready, an organization can do backward working from the final sales unit to raw materials required. Thus annual and quarterly plans are broken down into labor, raw material, working capital, etc. requirements over a medium-range period (6 months to 18 months). This process of working out production requirements for a medium range is called aggregate planning.

### Factors Affecting Aggregate Planning

**Aggregate planning is an operational activity critical to the organization as it looks to balance long-term strategic planning with short term production success**. Following factors are critical before an aggregate planning process can actually start;

* A complete information is required about available production facility and raw materials.
* A solid demand forecast covering the medium-range period
* Financial planning surrounding the production cost which includes raw material, labor, inventory planning, etc.
* Organization policy around labor management, quality management, etc.

For aggregate planning to be a success, following inputs are required;

* An aggregate demand forecast for the relevant period
* Evaluation of all the available means to manage capacity planning like sub-contracting, outsourcing, etc.
* Existing operational status of workforce (number, skill set, etc.), inventory level and production efficiency

Aggregate planning will ensure that organization can plan for workforce level, inventory level and production rate in line with its strategic goal and objective.

### Aggregate planning as an Operational Tool

Aggregate planning helps achieve balance between operation goal, financial goal and overall strategic objective of the organization. It serves as a platform to manage capacity and demand planning.

In a scenario where demand is not matching the capacity, an organization can try to balance both by pricing, promotion, order management and new demand creation.

In scenario where capacity is not matching demand, an organization can try to balance the both by various alternatives such as.

* Laying off/hiring excess/inadequate excess/inadequate excess/inadequate workforce until demand decrease/increase.
* Including overtime as part of scheduling there by creating additional capacity.
* Hiring a temporary workforce for a fix period or outsourcing activity to a sub-contrator.

### Importance of Aggregate Planning

Aggregate planning plays an important part in achieving long-term objectives of the organization. Aggregate planning helps in:

* Achieving financial goals by reducing overall variable cost and improving the bottom line
* Maximum utilization of the available production facility
* Provide customer delight by matching demand and reducing wait time for customers
* Reduce investment in inventory stocking
* Able to meet scheduling goals there by creating a happy and satisfied work force

### Aggregate Planning Strategies

There are three types of aggregate planning strategies available for organization to choose from. They are as follows.

1. **Level Strategy**

As the name suggests, level strategy looks to maintain a steady production rate and workforce level. In this strategy, organization requires a robust forecast demand as to increase or decrease production in anticipation of lower or higher customer demand. Advantage of level strategy is steady workforce. Disadvantage of level strategy is high inventory and increase back logs.

1. **Chase Strategy**

As the name suggests, chase strategy looks to dynamically match demand with production. Advantage of chase strategy is lower inventory levels and back logs. Disadvantage is lower productivity, quality and depressed work force.

1. **Hybrid Strategy**

As the name suggests, hybrid strategy looks to balance between level strategy and chase strategy.

# Materials and Resource Requirement Planning

### Introduction

Success of an operation department of any organization is dependent upon an efficient production plan. One of the key essential of a production plan is material and manufacturing planning system. Material requirement planning plays a pivotal role in assembly-line production. Material requirement planning is a system based approach, which organizes all required production material.

Material requirement planning is an information system for production planning based on inventory management. The basic components of material planning are:

* Material planning provides information that all the required raw material and products are available for production.
* Material planning ensures that inventory level are maintained at its minimum levels. But also ensures that material and product are
* available whenever production is scheduled, therefore, helping in matching demand and supply.
* Material planning provides information of production planning and scheduling but also provides information around dispatch and stocking.

### Objective of Material Requirement Planning

Material requirement planning is processed which production planning and inventory control system, and its three objectives are as follows:

* Primary objective is to ensure that material and components are available for production, and final products are ready for dispatch.
* Another primary objective is not only to maintain minimum inventory but also ensure right quantity of material is available at the right time to produce right quantity of final products.
* Another primary objective is to ensure planning of all manufacturing processes, this scheduling of different job works as to minimize or remove any kind of idle time for machine and workers.

### Advantages and Disadvantages of Material Resource Planning

As with every system based process, material resource planning also has its advantages and disadvantages, and they are as follows:

### Advantages of Material Resource Planning

* It helps in maintain minimum inventory levels.
* With minimum inventory levels, material planning also reduces associated costs.
* Material tracking becomes easy and ensures that economic order quantity is achieved for all lot orders.
* Material planning smoothens capacity utilization and allocates correct time to products as per demand forecast.

### Disadvantages of Material Resource Planning

* Material planning is highly dependent on inputs it receives from other systems or department. If input information is not correct than output for material planning will also be incorrect.
* Material planning requires maintenance of robust database with all information pertaining inventory records, production schedule, etc. without which output again would be incorrect.
* Material planning system requires proper training for end users, as to get maximum out of the system.
* Material resource planning system requires substantial investment of time and capital.

### Material Resource Planning - Inter dependency of Business Function

Material planning not only benefits operation department but is also beneficial to the other department of organization. They are as follows:

* Material planning is useful in determining cash flow requirement based on material requirements and final dispatch schedules.
* It helps procurement team in scheduling purchase of necessary material.
* It helps the sales team in determining delivery dates for final products.

### Implementation of Material Resource Planning

Implementation and success of material resource planning dependent on following factors:

* Acceptability of by top management about advantages and benefits
* Proper training and participation of all workers and personnel
* Precision and accuracy of input data for accurate and reliable results