**Topic 13: Scheduling**

Overview

This relates to scheduling products to meet fluctuating demands such as seasonal variation. It involves developing plans to minimise costs with varying demands and this is known as aggregate planning or aggregate scheduling. Aggregate means putting together all similar products or models into a single product. In large department stores, space allocation is used for aggregate decision. A manager may allocate certain area of the space for different types of clothing. In a manufacturing firm, aggregate scheduling is produce different quantities of products at different times.

The objective of aggregate scheduling is to meet forecasted demand while minimizing cost over the planning period.

Learning Outcomes

By the end of this topic, you will be able to:

1. apply scheduling productions according with the fluctuating demands especially seasonal demands.
2. focus an overall demand and the overall capacity required to have for production requirements e.g. able to use the available space to store different types of clothing that are produced on the aggregate basis.
3. plan for long range, medium range and short range demands of products.
4. develop strategies to meet demands within 18 months’ time frame.
5. relate production to the changing demands by using five capacity options.
6. distinguish the differences between manufacturing and services in meeting demands.
7. apply the concept of disaggregating the aggregate plan(schedule).

Introduction

13.1 Scheduling concept and its objective.

13.2 The objective of aggregate scheduling and the range of planning

13.3 How is aggregate scheduling done.

13.4 Three ways by which demands appear and five capacity options to meet changing

 demands.

13.5 Aggregate planning for services

13.6 Concept of ‘disaggregating the aggregate plan (schedule). and the master schedule.

Lesson 13 : Scheduling

In lesson 12, we studied abut managing inventory which is an important aspect of production process. Today we examine the second aspect of the production process, the scheduling of production to meet the outputs for the customers.

 Inventory Management Production Process Outputs

How do we schedule production of the outputs?

1. Scheduling production has to go hand-in-hand with the fluctuating demands especially seasonal demands.

 Demands Production (Capacity)

1. Scheduling production is done in the form of aggregating the products (lumping together similar products as a group or a family).
2. This is the reason of schedule planning becomes known as aggregate planning or aggregate scheduling i.e. so much to produce within a certain time frame.
3. This enables the focusing of an overall demand and the overall capacity required to have for production requirements. E.g. a department store has an allocated space for clothing; this space has to be used on an aggregate basis i.e. different types of clothing are given the requirement areas within the given space.
4. The objective of aggregate scheduling is basically to meet the forecasted demand at the minimal cost over the planning period.
5. The range of planning i.e. the time frame can be:
* Long range forecasts (> 1 year) and this is done by top management so that it is able to learn of the capacity, location and expansion, product development, research funding and investment over time.
* Medium range planning (3 months – 18 months) and this is the job of the operations managers. They need to address problems of matching productivity with fluctuating demands. This medium range plan must be in line with the long term plan.
* Short range plan (3 months) and this is the responsibility of the operations personnel who worked with the supervisors and foremen. They are responsible for the hourly, daily, weekly work schedule such as loading, sequencing and expediting and dispatching.

How is aggregate scheduling done?

1. The operations manager (OM) identifies the rate of output for a facility over the next 3 months – 18 months. If the manufacturing organisation has a family of products, then the OM has to define what members of the family of products to be produced at different periods of time over the 18 months. This is done in order to identify the operations capacity required.

(This is assumed that prior to this, the OM is aware of the forecast demands, facility capacity, inventory levels, work force size and related inputs availability.)

1. The OM must ensure that the aggregate schedule must interrelate and integrate with other departmental functions in the organisation. This is because the OM does not just receive information from the marketing department but must deal with other departments for financial data, personnel, capacity and availability of raw materials. This implies that the aggregate schedule is made up of a composite data from other departments. In this way, the master production schedule (MPS) is created and is for the purpose of production over a time frame. The MPS addresses the purchasing of raw materials, parts or components needed to make the final products.

 The planning sequence can be presented as follows:

 Corporate strategies PEST Aggregate demand forecast

 & policies

 Business Plan Establishes operations &

 capacity strategies

 Aggregate Plan Establishes operations capacity

 Master Schedule Establishes schedules for specific

 products

**Aggregate Planning Strategies**

Any strategy that is accepted, it must be able to meet the demands within the 18 months’ time frame.

The strategies (actions taken) may involve manipulating the inventory, production rates, labour levels, capacity and other controllable variables such as subcontracting for parts or use part time workers.

**Production must relate to the demand**

(a) Demand can come in three possible ways/options:

1. Influencing demand through the use of promotion in order to use excess capacity because of uncertainty in demand. Its disadvantage is the situation of uncertainty in demand.
2. Back ordering during high demand periods i.e. firm accepts orders but supply the goods at a later period in order to avoid OT, keep capacity constant, but customers must accept to wait and there may a loss of goodwill (a disadvantage).
3. New demand i.e. additional orders beyond the expected demand e.g. seasonal changes or festivals. There is full utilization of resources and stability of workforce. The disadvantage is that there is a need to look for new skills or technology to stabilise production according to demand changes and it is possible that it may involve looking for outsourcing.

(b) OM may use five capacity options to meet changing demands in the aggregate schedule for

 production.

1. Changing the inventory levels – although there is no change in human resource but the holding of inventory may increase holding costs or may result in shortages which may result on loss of sales.
2. Varying workforce size by hiring or layouts – instead of saving cost, hiring, layoff and training cost may be expensive.
3. Varying production rates through overtime or idle time – this is done to match seasonal fluctuation without hiring or training cost but the disadvantages are overtime cost can be high, workers are tired and may not meet demand.
4. Subcontracting – this may allow flexibility and smoothing of the firm’s output but it may suffer the loss of quality control, reduced profits and loss of future business.
5. Using part-time workers – it is less costly and more flexible than full-time workers but it can lead to high turnover or training costs and loss of quality and difficulty in scheduling of production.

It is obvious the OM may use the 5 capacity options to build the aggregate schedule for production. This leads to a range of possible strategies that ranges from ***Chase strategy*** (where outputs are to match demand at different time) at one end of the continuum to ***Level scheduling (demand) strategy*** (where production is uniform from period to period) at the other end.

Other strategies are in between these 2 extreme strategies where products are made to meet varying demands.

 ***Chase strategy Level scheduling (demand)***

 ***strategy***

 A Continuum of Strategies

There are methods and techniques for aggregate scheduling such as graphic methods and mathematical approaches such as linear programming and management coefficient model and others.

**Aggregate Planning for Services**

It takes into account of projected demands of customers, equipment capacities and labour capabilities. The resultant plan is a time-phased projection of services staff requirements.

***Differences between Manufacturing and Services***

1. Services occurred when they are required.
2. Demand for services is difficult to predict i.e. variable.
3. Labour flexibility is needed in services.

**Concept of ‘disaggregating the aggregate plan (schedule)’**

It is the breaking down of the aggregate plan into specific product lines/groups thereby a detail of the requirements for each product line are determined. The outcome of the disaggregated plan is known as the **Master Schedule** where it showed the planned outputs for individual products along with their timings of production. It also provides information about the marketing, orders and completion of orders for shipping.

However, it does not show planned production and this is found in the Master Production Schedule (MPS). The MPS reveals the quantity and timing of planned production as well as taking into account the desired delivery quantity and the on-hand inventory in a short range period of demand (about 3 months).

The Master Scheduling Process is presented as follows:

 Inputs Outputs

 Beginning inventory Master Projected inventory of outputs

 Forecast demand Scheduling Master production schedule (for

 Customer orders (12 months) short range 1-3 months)

 Uncommitted inventory

 The Master Scheduling **Process**

**Note:**

**1. The master schedule is set for about 12 months.**

**2. The Master Production Schedule is for about 3 months i.e. can be in weeks or 2-3 months.**