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Master Production Schedule

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What is Master Production Schedule or MPS?

A Master Production Schedule or MPS is the plan that a company has developed for production, inventory, staffing, etc. It sets the quantity of each end item to be completed in each week of a short-range planning horizon. A Master Production Schedule is the master of all schedules. It is a plan for future production of end items.

MPS INPUTS: --> Forecast Demand --> Production Costs --> Inventory Costs --> Customer Orders --> Inventory Levels --> Supply --> Lot Size --> Production Lead Time --> Capacity

MPS OUTPUT (production plan): --> Amounts to be Produced --> Staffing Levels --> Quantity Available to Promise --> Projected Available Balance

The Master Production Schedule gives production, planning, purchasing, and top management the information needed to plan and control the manufacturing operation. The application ties overall business planning and forecasting to detail operations through the Master Production Schedule.

The Master Production Schedule will drive detailed material and production requirements in the Material Requirements Planning module.

Due to software limitations, but especially the intense work required by the "master production schedulers", schedules do not include every aspect of production, but only key elements that have proven their control effectivity, such as forecast demand, production costs, inventory costs, lead time, working hours, capacity, inventory levels, available storage, and parts supply. The choice of what to model varies among companies and factories. The MPS is a statement of what the company expects to produce and purchase (i.e. quantity to be produced, staffing levels, dates, available to promise, projected balance).[1][2]

The MPS translates the business plan, including forecast demand, into a production plan using planned orders in a true multi-level optional component scheduling environment. Using MPS helps avoid shortages, costly expediting, last minute scheduling, and inefficient allocation of resources. Working with MPS allows businesses to consolidate planned parts, produce master schedules and forecasts for any level of the Bill of Material (BOM) for any type of part.

How an MPS works

By using several variables as inputs the MPS will generate a set of outputs used for decision making. Inputs may include forecast demand, production costs, inventory costs, customer orders, inventory levels, supply, lot size, production lead time, and capacity. Inputs may be automatically generated by an ERP system that links a sales department with a production department. For instance, when the sales department records a sale, the forecast demand may be automatically shifted to meet the new demand. Inputs may also be inputted manually from forecasts that have also been calculated manually. Outputs may include amounts to be produced, staffing levels, quantity available to promise, and projected available balance. Outputs may be used to create a Material Requirements Planning (MRP) schedule.

A master production schedule may be necessary for organizations to synchronize their operations and become more efficient. An effective MPS ultimately will:

â€¢ Give production, planning, purchasing, and management the information to plan and control manufacturing[2]

â€¢ Tie overall business planning and forecasting to detail operations[2]

â€¢ Enable marketing to make legitimate delivery commitments to warehouses and customers

â€¢ Increase the efficiency and accuracy of a company's manufacturing

MPS issues:

â€¢ Width of the time bucket

â€¢ Planning horizon

â€¢ Rolling plan

â€¢ Time fencing

â€¢ Schedule freezing

Production plan

An example of a master production schedule for "product A".

Competition is the battle between businesses to win consumer acceptance and loyalty. The free-enterprise system ensures that businesses make decisions about what to produce, how to produce it, and what price to charge for the product or service. Competition is a basic premise of the free-enterprise system because it is believed that having more than one business competing for the same consumers will cause the products and/or services to be provided at a better quality and a lower cost than if there were no competitors. In other words, competition should provide the consumers with the best value for their hard-earned dollar.

FORMS OF COMPETITION

Although each form has many aspects, not all of which can be considered here, competition can generally be classified into four main categories: perfect competition, monopolistic competition, oligopoly, and monopoly. (Table 1 summarizes the basic differences among these four types of competition.)

Perfect Competition Perfect competition (also known as pure competition) exists when a large number of sellers produce products or services that seem to be identical. These types of businesses are typically run on a small scale, and participants have no control over the selling price of their product because no one seller is large enough to dictate the price of the product. Instead, the price of the product is set by the market. There are many competitors in a perfect competition industry, and it is fairly easy to enter or leave the industry. While there are no ideal examples of perfect competition, agricultural products are considered to be the closest example in today's economy. The corn grown by one farmer is virtually identical to the corn grown by another farmer, and the current market controls the price the farmers receive for their crops. Perfect competition follows the law of supply and demand. If the price of a product is high, consumers will demand less of the product while the suppliers will want to supply more. If the price of a product is low, the consumers will demand more of the product, but the suppliers will be unwilling to sell much at such a low price. The equilibrium point is where the supply and the demand meet and determine the market price. For example, if the going market price for wheat is $5 a bushel and a farmer tries to sell wheat for $6 a bushel, no one will buy because they can get it for $5 a bushel from someone else. On the other hand, if a farmer offers to sell wheat for $4 a bushel, the crop will sell, but the farmer has lost money

because the crop is worth $5 a bushel on the open market.

Monopolistic Competition Monopolistic competition exists when a large number of sellers produce a product or service that is perceived by consumers as being different from that of a competitor but is actually quite similar. This perception of difference is the result of product differentiation, which is the key to success in a monopolistic industry. Products can be differentiated based on price, quality, image, or some other feature, depending on the product. For example, there are many different brands of bath soap on the market today. Each brand of soap is similar because it is designed to get the user clean; however, each soap product tries to differentiate itself from the competition to attract consumers. One soap might claim that it leaves you with soft skin, while another soap might claim that it has a clean, fresh scent. Each participant in this market structure has some control over pricing, which means it can alter the selling price as long as consumers are still willing to buy its product at the new price. If one product costs twice as much as similar products on the market, chances are most consumers will avoid buying the more expensive product and buy the competitors' products instead. There can be few or many competitors (typically many) in a monopolistic industry, and it is somewhat difficult to enter or leave such an industry. Monopolistic products are typically found in retailing businesses. Some examples of monopolistic products and/or services are shampoo products, extermination services, oil changes, toothpaste, and fast-food restaurants.

Oligopoly An oligopoly (which is described more completely in another article) exists when there are few sellers in a certain industry. This occurs because a large investment is required to enter the industry, which makes it difficult to enter or leave. The businesses involved in an oligopoly type of industry are typically very large because they have the financial ability to make the needed investment. The type of products sold in an oligopoly can be similar or different, and each seller has some control over price. Examples of oligopolies include the automobile, airplane, and steel industries.

Monopoly A monopoly (which is described more completely in another article) exists when a single seller controls the supply of a good or service and prevents other businesses from entering the field. Being the only provider of a certain good or service gives the seller considerable control over price. Monopolies are prohibited by law in the United States; however, government-regulated

Types of Competition

Characteristics Perfect Competition Monopolistic Competition Oligopoly Monopoly

Number of competitors Many Few to many Very few No direct competition

Ease of entry or exit from industry Easy Somewhat difficult Difficult Regulated by government

Similarity of goods/services offered by competing firms Same Seemingly different but may be quite similar Similar or different No directly competing products

Individual firm's control over price None (set by the market) Some Some Considerable (in true monopoly) Little (in regulated one)

Examples Farmer Fast-food restaurant Automotive manufacturer Power company

In economics, market structure (also known as the number of firms producing identical products).

â€¢ Monopolistic competition, also called competitive market, where there are a large number of firms, each having a small proportion of the market share and slightly differentiated products.

â€¢ Oligopoly, in which a market is dominated by a small number of firms that together control the majority of the market share.

â€¢ Duopoly, a special case of an oligopoly with two firms.

â€¢ Oligopsony, a market where many sellers can be present but meet only a few buyers.

â€¢ Monopoly, where there is only one provider of a product or service.

â€¢ Natural monopoly, a monopoly in which economies of scale cause efficiency to increase continuously with the size of the firm. A firm is a natural monopoly if it is able to serve the entire market demand at a lower cost than any combination of two or more smaller, more specialized firms.

â€¢ Monopsony, when there is only one buyer in a market.

â€¢ Perfect competition is a theoretical market structure that features unlimited contestability (or no barriers to entry), an unlimited number of producers and consumers, and a perfectly elastic demand curve.

The imperfectly competitive structure is quite identical to the realistic market conditions where some monopolistic competitors, monopolists, oligopolists, and duopolists exist and dominate the market conditions. The elements of Market Structure include the number and size distribution of firms, entry conditions, and the extent of differentiation.

These somewhat abstract concerns tend to determine some but not all details of a specific concrete market system where buyers and sellers actually meet and commit to trade. Competition is useful because it reveals actual customer demand and induces the seller (operator) to provide service quality levels and price levels that buyers (customers) want, typically subject to the sellerâ€™s financial need to cover its costs. In other words, competition can align the sellerâ€™s interests with the buyerâ€™s interests and can cause the seller to reveal his true costs and other private information. In the absence of perfect competition, three basic approaches can be adopted to deal with problems related to the control of market power and an asymmetry between the government and the operator with respect to objectives and information: (a) subjecting the operator to competitive pressures, (b) gathering information on the operator and the market, and (c) applying incentive regulation.[1]

Quick Reference to Basic Market Structures

Market Structure Seller Entry Barriers Seller Number Buyer Entry Barriers Buyer Number

Perfect Competition

No Many No Many

Monopolistic competition

No Many No Many

Oligopoly

Yes Few No Many

Oligopsony

No Many Yes Few

Monopoly

Yes One No Many

Monopsony

No Many Yes One

The correct sequence of the market structure from most to least competitive is perfect competition, imperfect competition, oligopoly, and pure monopoly.

The main criteria by which one can distinguish between different market structures are: the number and size of producers and consumers in the market, the type of goods and services being traded, and the degree to which information can flow freely.

AGGREGATE PLANNING

Planning is a primary management responsibility. Aggregate planning is concerned with organizing the quantity and timing of production over a medium period of time up to eight to ten months with undetermined demand. Specifically aggregate planning means combining all of an organization`s resources into one aggregate production schedule for a predetermined intermediate time period. The objective of aggregate planning is to maximize resources while minimizing cost over the planning period.

The aggregate production plan is midway between short-range planning and long-range planning. Aggregate planning includes the following factors:

1. Work force size and composition

2. Demand forecasts and orders

3. Raw material planning

4. Plant capacity management

5. Utilizing outside subcontractors

6. Inventory management

Aggregate planning is the link between short-term scheduling and long-term capacity planning.

What are aggregate planning strategies?

There are three types of aggregate planning strategies:

Pure Strategy. In this strategy, only one production or supply factor is changed.

Mixed Strategy. This strategy simultaneously alters two or more production or supply factors or some combination.

Level Scheduling. This strategy has been adopted by the Japanese and it embodies maintaining constant monthly production schedules.

What aggregate planning strategies influence demand?

Aggregate planning can influence demand in the following ways:

1. Pricing strategies. Pricing can be used to increase or reduce demand. All things being equal, increasing prices reduces demand while lowering prices will increase demand.

2. Advertising and promotion strategies. Advertising and promotion are pure demand management strategies in that they can increase demand by making a product or service better known as well as

positioning it for a particular market segment.

3. Delayed deliveries or reserving orders. Managing future delivery schedules is a strategy for managing orders when demand exceeds capacity. The net effect of delayed deliveries, or back ordering, and reservations is to shift demand to a later period of time, often to a more slack period, which provides a smoothing effect for overall demand. However, the negative is that a percentage of orders will be lost as consumers are unwilling or unable to wait the additional amount of time.

4. Diversifying the product mix. Product mix diversification is a method used to offset demand seasonality. For example, a lawn mower manufacturing company may diversify into snow removal equipment to offset the seasonality of the lawn mower industry.

What aggregate planning strategies influence supply?

Aggregate planning is also used to manage supply considerations by using the following strategies:

1. Subcontracting (outsourcing). Subcontracting is a method of increasing capacity without incurring large capital investment charges. It can turn the competitive advantage of other corporations to the contracting organization`s advantage. However, subcontracting can be costly, and also reveals part of the business to potential competitors.

2. Overtime and idle time. A direct short-term strategy for managing production capacity is to either increase or decrease the number of the work force. This strategy has the advantage of utilizing the currently existing work force. However, overtime is expensive and can produce job burnout if relied upon too extensively. On the other hand, enforcing idle time on the work force can result in resistance as well as a drop in morale.

3. Hiring and laying off employees. Hiring and laying off employees is a medium- to long-term strategy for increasing or decreasing capacity. Hiring employees usually involves the cost of training while laying off employees can incur severance charges. Laying off employees can also cause labor difficulties with unions and reduce morale

4. Stockpiling inventory. Accumulating inventory is a strategy for smoothing variances which may occur between demand and supply.

5. Part-time employees. Certain industries have seasonal requirements for lower skilled employees. Aggregate planning can be used to manage these seasonal requirements.

What is the charting method of aggregate planning?

Charting is a highly utilized trial-and-error aggregate planning method. It is relatively simple to use and is easily understood. Essentially, the charting approach uses a few variables in forecasting demand, applying current production capacity. While the charting method does not assure an accurate prediction, it is simple to implement requiring only minimal calculations. But trial and error method does not provide an optimal solution.

The charting method requires five steps to implement:

1. Calculate each period`s demand.

2. Calculate each period`s production capacity for regular time, overtime, and subcontracting.

3. Determine all labor costs including costs for hiring and layoffs as well as the cost of holding inventory.

4. Evaluate organizational employee and stock policies.

5. Create optional policies and evaluate their costs.

EXAMPLE 1.30

A Florida men`s suit manufacturer has created expected demand forecasts for the period June-January, as shown in Table 1.2.

The daily demand is calculated by dividing the total expected demand by the number of monthly working days:

AVERAGE DEMAND = TOTAL EXPECTED DEMAND / NUMBER OF PRODUCTION DAYS

FIGURE 1.6 MONTHLY AND AVERAGE MEN`S SUIT DEMAND

The graph in Figure 1.6 illustrates that there is a substantial variance between the monthly and average men`s suit demand.

What are the costs of aggregate planning?

Aggregate planning is a systems methodology having major organizational impacts. Every strategy has associated costs and benefits. Increasing hiring means increasing training costs and incurring associated employment benefit costs. Increasing inventory increases carrying costs consisting of capital and storage costs, deterioration, and obsolescence. Using part-time employees involves the costs and risks of using improperly trained and inexperienced personnel as well as creating possible union conflicts. Using subcontractors has the cost of exposing an organization to potential competitors.

EXAMPLE 1.31

Using the data in example 1.30, it is possible to develop cost estimates for the men`s suit manufacturer. Basically, the manufacturer has three choices:

1. The manufacturer can meet expected monthly production fluctuations by varying the work force size, hiring and laying off employees as needed. In this scenario, an assumption is made that the men`s suit manufacturer has a constant staff of 55 employees.

2. Another alternative is to maintain a constant work force of 51 employees and subcontract for additional expected demand.

3. A third alternative is to maintain a work force of 69 employees and store suits during the slack demand months.

Organizational Costs

THREE PLAN SUMMARY COSTS

In this example, the best production plan is plan 3 which maintains a work force of 69 employees and stores men`s suit inventory during low demand months.

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