

<b>MBA First Year</b>	<b>Assignment Solution in Production and Operation Management</b>
<b>Even Semester (Second Semester)</b>	<b>MBA110</b>
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### **Assignment Problem Number Three**

**Question Number 1.) Describe Line of Balance, scheduling and routing decision with example?**

**Answer-**

The Line of Balance (LOB) Scheduling Technique was originated by the Goodyear Company in the early 1940's and was developed by the U.S. Navy in the early 1950's for the programming and control of both repetitive and non-repetitive projects. It was developed for industrial manufacturing and production control. The basic concepts of LOB have been applied in the construction industry as planning and scheduling method.

A line of balance diagram comprises a series of inclined lines which represent the rate of working between repetitive operations in a construction sequence. The Line-of-Balance also known as the Repetitive Scheduling Method (RSM), Location Based Scheduling, Vertical Production Method or Vertical Scheduling Method. It's the best planning method for a repetitive work such as Villas or Dwelling units, High-rise building, highways, pipeline, tunnels, railway, however it may be adapted for non-repetitive projects as well.

Line of Balance (LOB) is a method of showing the repetitive work that may exist in a project as a single line on a graph. Unlike a Bar Chart, which shows the duration of a particular activity, a LOB Chart shows the rate at which the work that makes up all of the activities has to be undertaken to stay on schedule, the relationship of one trade or process to the subsequent trade or process is defined by the space between the lines.

Line of Balance (LOB) is a management control process for collecting, measuring and presenting facts relating to time (schedule control), cost and accomplishment – all measured against a specific plan. It shows the process, status, background, timing and phasing of the project activities, thus providing management with measuring tools that help:

- 1.) Comparing actual progress with a formal objective plan.
- 2.) Examining only the deviations from established plans, and gauging their degree of severity with respect to the remainder of the project.
- 3.) Receiving timely information concerning trouble areas and indicating areas where appropriate corrective action is required.
- 4.) Forecasting future performance.

The LOB chart comprises only one feature of the whole philosophy which includes numerous danger signal controls for all the various levels of management concerned.

To do LOB, the following is required:

- (a.) A contract schedule, or objective chart;
- (b.) A production plan or lead-time chart for the production process itself;
- (c.) Control points cumulative inventories; and
- (d.) A program status chart on which to plot LOB and the cumulative quantities of units that have passed through the control points of the assembly/production process.

## **Scheduling**

**Scheduling** is the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process. Scheduling is used to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials.

It is an important tool for manufacturing and engineering, where it can have a major impact on the productivity of a process. In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility when to make, with which staff, and on which equipment. Production scheduling aims to maximize the efficiency of the operation and reduce costs.

- a.) Forward scheduling is planning the tasks from the date resources become available to determine the shipping date or the due date.
- b.) Backward scheduling is planning the tasks from the due date or required-by date to determine the start date and/or any changes in capacity required.

The benefits of production scheduling include:

- Process change-over reduction
- Inventory reduction, leveling
- Reduced scheduling effort
- Increased production efficiency
- Labor load leveling
- Accurate delivery date quotes
- Real time information

Production scheduling tools greatly outperform older manual scheduling methods. These provide the production scheduler with powerful graphical interfaces which can be used to visually optimize real-time work load in various stages of production, and pattern recognition allows the software to automatically create scheduling opportunities which might not be apparent without this view into the data. For example, an airline might wish to minimize the number of airport gates required for its aircraft, in order to reduce costs, and scheduling software can allow the planners to see how this can be done, by analyzing time tables, aircraft usage, or the flow of passengers.

**Question Number- 2.) Explain Inventory management and factors related to inventory management?**

**Answer-**

Inventory management refers to the process of ordering, storing, and using a company's inventory. These include the management of raw materials, components, and finished products, as well as warehousing and processing such items.

For companies with complex supply chains and manufacturing processes, balancing the risks of inventory gluts and shortages is especially difficult. To achieve these balances, firms have developed two major methods for inventory management: just-in-time and materials requirement planning: just-in-time (JIT) and materials requirement planning (MRP).

### **How Inventory Management works**

A company's inventory is one of its most valuable assets. In retail, manufacturing, food service, and other inventory-intensive sectors, a company's inputs and finished products is the core of its business. A shortage of inventory when and where it's required can be extremely detrimental.

At the same time, inventory can be thought of as a liability (if not in an accounting sense). A large inventory carries the risk of spoilage, theft, damage, or shifts in demand. Inventory must be insured, and if it is not sold in time it may have to be disposed of at clearance prices—or simply destroyed.

For these reasons, inventory management is important for businesses of any size. Knowing when to restock certain items, what amounts to purchase or produce, what price to pay—as well as when to sell and at what price—can easily become complex decisions. Small businesses will often keep track of stock manually and determine the reorder points and quantities using Excel formulas. Larger businesses will use specialized enterprise resource planning (ERP) software. The largest corporations use highly customized software as a service (SaaS) applications.

Appropriate inventory management strategies vary depending on the industry. An oil depot is able to store large amounts of inventory for extended periods of time, allowing it to wait for demand to pick up. While storing oil is expensive and risky—a fire in the Storage place, led to millions of rupees in damage and fines—there is no risk that the inventory will spoil or go out of style. For businesses dealing in perishable goods or products for which demand is extremely time-sensitive—2019 calendars or fast-fashion items, for example—sitting on inventory is not an option, and misjudging the timing or quantities of orders can be costly.

When managing your inventory processes, there are a variety of factors which you need to consider. Both external and internal factors can affect inventory management in different ways, and it is important to be aware of these variables.

The main factors that can affect inventory processes.

1. Financial Factors-- Factors such as the cost of borrowing money to stock enough inventories can greatly influence inventory management. In this case, your finances may fluctuate according to the economy, and it is wise to keep an eye on changing interest rates to help plan you're spending.

The tax costs associated with stocking inventory is another factor that can influence inventory management. This is especially salient when preparing for the end of year tax returns.

Other financial factors include the expenses associated with warehouse operations and transportation costs changes in these factors may require you to alter your inventory management processes accordingly. Fluctuations in the cost of fuel, for example, may require you to rethink your transportation methods to reduce costs. You may choose to purchase your own trucks or use outside contractors for transportation, which again will change the way you manage inventory.

## 2. Suppliers

Suppliers can have a huge influence on inventory control. Successful businesses require reliable suppliers in order to plan spending and arrange production. An unreliable or unpredictable supplier can have huge knock-on effects for inventory control. It can be a good idea to ensure you have a reliable back up supplier to prevent product shortages or delays in the manufacturing process.

## 3. Lead Time

Lead time is the time it takes from the moment an item is ordered to the moment it arrives. Lead time will vary widely depending on the product type and the various manufacturing processes involved, and therefore changes in these factors can require changes to inventory management.

Outsourcing manufacturing processes to other countries due to lower production costs may result in longer waiting times. Producing the same goods locally may cost more but take less time, and therefore you may need to adjust your stock levels accordingly.

## 4. Product Type

Inventory management must take into consideration the different types of products in stock. For example, some products may be perishable and therefore have a shorter shelf life than others. In this case inventory must be managed to ensure that these items are rotated in line with expiration dates.

## 5. Management

Ultimately, responsibility for managing your business' inventory sits with you and any co-owners. While you may have multiple employees acting as managers to oversee inventory processes, they typically will not have the same stake in the business as you do.

## 6. External Factors

There are multiple external factors that may affect inventory control. For example, economic downturns may occur and this is something that you will generally have very little control over. Assessing the economy is a must in order to guard against stock outs or a buildup of excess inventory.

Other factors may include the real estate markets or the extent of local competition. These factors are also largely out of your control, so it is a good idea to assess the external climate regularly in order to stay prepared.

### **Inventory Control Vs Inventory Management**

Inventory control and inventory management are often used interchangeably. Though they have similar scopes, there are some important distinctions to make. Inventory control is a method of regulating the inventory you have on hand in your warehouse. On the other hand, inventory management is the activity of forecasting and replenishing inventory, focused on when to order stock, in what quantities and from which supplier.

Inventory control regulates the inventory that is already in your warehouse. This involves knowing what is in stock inside and out – how much is available, where is it located in the warehouse and in what condition it's in. It is also about ensuring your warehouse is set up in a way that allows warehouse staff to quickly pick and pack to speed up customer order fulfillment.

**Question Number 3.) Describe inventory control techniques in details, like ABC, VED, EOQ?**

**Answer-**

Inventory control regulates the inventory that is already in your warehouse. This involves knowing what is in stock inside and out – how much is available, where is it located in the warehouse and in what condition it's in. It is also about ensuring your warehouse is set up in a way that allows warehouse staff to quickly pick and pack to speed up customer order fulfillment.

In controlling the inventory you have on hand, you'll also be aiming to keep inventory costs down. This can involve identifying the least popular items and reducing the stock, accurately forecasting changes in demand to avoid overstocking. For food and beverage manufacturers, this involves minimizing waste by using inventory before they expire.

### ABC Inventory Control

ABC analysis is an approach for classifying inventory items based on the items' consumption values. Consumption value is the total value of an item consumed over a specified time period, for example a year. The approach is based on the Pareto principle to help manage what matters and is applied in this context:

- A items are goods where annual consumption value is the highest. Applying the Pareto principle (also referred to as the 80/20 rule where 80 percent of the output is determined by 20 percent of the input), they comprise a relatively small number of items but have a relatively high consumption value. So it's logical that analysis and control of this class is relatively intense, since there is the greatest potential to reduce costs or losses.
- B items are interclass items. Their consumption values are lower than A items but higher than C items. A key point of having this interclass group is to watch items close to A item and C item classes that would alter their stock management policies if they drift closer to class A or class C. Stock management is itself a cost. So there needs to be a balance between controls to protect the asset class and the value at risk of loss, or the cost of analysis and the potential value returned by reducing class costs. So, the scope of this class and the inventory management policies are determined by the estimated cost-benefit of class cost reduction, and loss control systems and processes.
- C items have the lowest consumption value. This class has a relatively high proportion of the total number of lines but with relatively low consumption values. Logically, it's not usually cost-effective to

deploy tight inventory controls, as the value at risk of significant loss is relatively low and the cost of analysis would typically yield relatively low returns.

Since businesses are not all the same, the thresholds that define the upper and lower limits of each class are not definable. Nor will they necessarily be fixed over time or across all locations. A business may have different risk appetites between different locations. For example, a location in a high-crime area may have a higher proportion of A items or, where a facility is less secure, more items may be classed as A. The management accountant should carry out risk and stock management cost-benefit analyses by location to deliver the optimal overall cost-benefit balance and to set the ABC ranges.

### **What benefits does the approach provide?**

- Better control over high-value inventory improves availability, and reduces losses and costs.
- More efficient use of stock management resources. For example, during stock count more resources are dedicated to A class than B or C class holdings, or fewer counts are made of B or C class holdings – which saves time and money.
- Relatively low value of B or C class holdings can allow a business to hold bigger buffer stocks to reduce stock outs.
- Fewer stock outs resulting in improved production efficiency.
- Fewer stock outs and improved production efficiency resulting in more reliable cycle time and, therefore, improved customer satisfaction.

### **VED Inventory Control**

VED stands for vital, essential and desirable. This analysis relates to the classification of maintenance spare parts and denotes the essentiality of stocking spares.

The spares are split into three categories in order of importance. From the view-points of functional utility, the effects of non-availability at the time of

requirement or the operation, process, production, plant or equipment and the urgency of replacement in case of breakdown.

Some spares are so important that their non-availability renders the equipment or a number of equipment in a process line completely inoperative, or even causes extreme damage to plant, equipment or human life.

On the other hand some spares are non-functional, serving relatively unimportant purposes and their replacement can be postponed or alternative methods of repair found. All these factors will have direct effects on the stocks of spares to be maintained.

**V:**

Vital items which render the equipment or the whole line operation in a process totally and immediately inoperative or unsafe; and if these items go out of stock or are not readily available, there is loss of production for the whole period.

**E:**

Essential items which reduce the equipment's performance but do not render it inoperative or unsafe; non-availability of these items may result in temporary loss of production or dislocation of production work; replacement can be delayed without affecting the equipment's performance seriously; temporary repairs are sometimes possible.

**D:**

Desirable items which are mostly non-functional and do not affect the performance of the equipment.

As the common saying goes "Vital Few — trivial many", the number of vital spares in a plant or a particular equipment will only be a few while most of the spares will fall in 'the desirable and essential' category.

However, the decision regarding the stock of spares to be maintained will depend not only on how critical the spares are from the functional point of view (VED analysis) but also on the annual consumption (user) cost of spares (ABC — analysis) and, therefore, for control of spare parts both VED and ABC analyses.

## **Economic order Quantity**

Economic order quantity (EOQ) is the ideal order quantity a company should purchase to minimize inventory costs such as holding costs, shortage costs, and order costs. This production-scheduling model was developed in 1913 by Ford W. Harris and has been refined over time. The formula assumes that demand, ordering, and holding costs all remain constant.

The goal of the EOQ formula is to identify the optimal number of product units to order. If achieved, a company can minimize its costs for buying, delivery, and storing units. The EOQ formula can be modified to determine different production levels or order intervals, and corporations with large supply chains and high variable costs use an algorithm in their computer software to determine EOQ.

EOQ is an important cash flow tool. The formula can help a company control the amount of cash tied up in the inventory balance. For many companies, inventory is its largest asset other than its human resources, and these businesses must carry sufficient inventory to meet the needs of customers. If EOQ can help minimize the level of inventory, the cash savings can be used for some other business purpose or investment.