

shirt would have to order it and wait several weeks or even months for it to be manufactured, depending on how little inventory existed in the supply chain.

Inventory also has a major impact on the material flow time in a supply chain. Material flow time is the time taken between the points at which material enters the supply chain to the point at which it exits. Another important area where inventory has a significant impact is throughput. For a supply chain, throughput is the rate at which sales occur. If inventory is represented by  $I$ , flow time by  $T$ , and throughput by  $D$ , the three can be related using Little's law as follows:

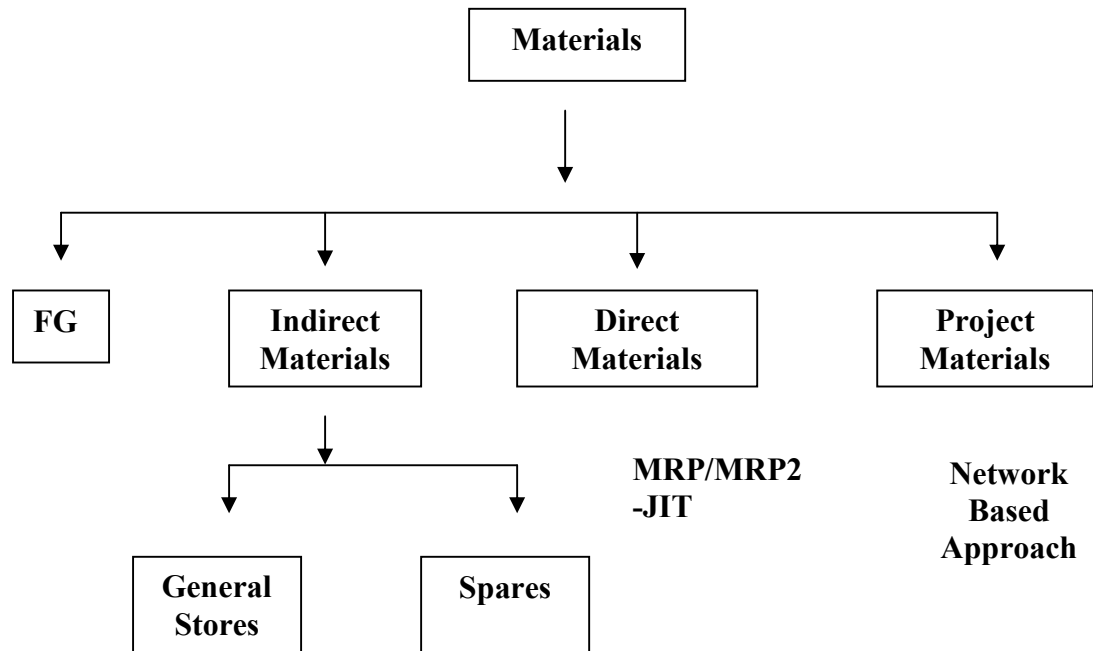
$$I = DT$$

For example, if the flow time of an auto assembly process is ten hours and the throughput is 60 units an hour, Little Law tells us that the inventory  $60 \times 10 = 600$  units. If we were able to reduce inventory to 300 units while holding throughput constant, we would reduce out flow time to five hours ( $300/60$ ). We note that in this relationship, inventory and throughput must have consistent units.

The logical conclusion here is that inventory and flow time are synonymous in any supply chain. Managers must use measures that lower the amount of inventory needed without increasing cost or reducing responsiveness, because reduced flow time can be a significant advantage in a supply chain.

## ***2.2 Role in the competitive strategy***

Inventory plays a important role in a supply chain's ability to support a company's competitive strategy. If a company's competitive strategy requires a very high level of responsiveness, a company can use inventory to achieve this responsiveness by locating large amounts of inventory close to the customer. Conversely, a company can also use inventory to make it more efficient by optimizing inventory through centralized stocking. The latter strategy would support a competitive strategy of being a low-cost producer. The trade-off implied in the inventory driver is between the responsiveness that results from more inventories and the efficiency that results from fewer inventories.

**2. Role of Inventory Control:**

- Replenishment systems
- ROL system
- Periodic review system
- Selective control methods

$$\text{ROI} = \frac{\text{PROFIT}}{\text{TOTAL ASSETS (FA+CA)}}$$

- Materials account for nearly 50% of total costs
- Inventory accounts for nearly 75% of CA

Achieving the objectives of inventory control will result in more return on capital which is the prime objective of an organization, whether commercial or industrial. The formula given above is useful in arriving at the return of investment.

Another measure of healthiness of inventory control is Inventory Turnover Ratio (ITR). It is the ratio of total sales during specific time period (generally 1 year) to average inventory on hand during that time period.

Inventory Turnover ratio (ITR) (Finished Goods)

$$= \text{Annual Sales} / \text{Average Inventory}$$

Inventory Turnover Ratio (ITR) (Raw Material)

$$= \text{Annual Consumption} / \text{Average inventory}$$

### Example

The following table shows the sales and inventory details (in millions) of 3 sub assemblies A, B & C of a project.

| Particulars    | A   | B  | C | Total |
|----------------|-----|----|---|-------|
| Sales          | 320 | 40 | 2 | 362   |
| Raw Material   | 31  | 5  | 4 | 40    |
| Finished Goods | 22  | 9  | 8 | 39    |
| WIP            | 10  | 4  | 2 | 16    |
| Others         | 17  | 2  | 2 | 21    |

$$\text{ITR (A)} = 320:80 = 4:1$$

$$\text{ITR (B)} = 40:20 = 2:1$$

ITR (C) =  $2:16 = 1:8$  (Very Poor)

**CHAPTER - 3**

A very high inventory ratio is vital for the healthiness of an organization.

**3. Functions of Inventory**

Inventories have four functions. They are:

**Minimize costs at acceptable inventory levels:** Replacing inventories in exceptionally small quantities result in low investments but high ordering costs. Thus, a point has to be set where the total inventory carrying cost is bare minimum but the level of inventory is such that it does not effect the production or customer base.

**Provide desired customer service level:** Inventories offer service in terms of satisfying customer demand. Inventory influences the time and costs of service. The location of inventory determines the time in which the customer will be served while a company policies concerning the economic order quantity, safety stocks, placement procedures and time will determine the cost at which the customer will be served.

**Couple successive operations or functions:** The decoupling effect of inventories is apparent throughout manufacturing and distributions systems. Normally in the absence of inventories in a system, a demand by a customer triggers a chain reaction of demand at each preceding level, i.e. manufacturing and purchasing. But the customer does not have time or patience to wait for the chain reaction.

A small inventory requires frequent response rather than instant response from the transport system, where as, a large inventory reduces the need for frequent response and cost of transport system .The decoupling effect of inventories allows a physical distribution manager to choose amongst various inventory management policies.

**Stabilize production and the labor force, thereby trying to reduce capital requirements:** This function of inventories is more associated to the manufacturing process, though it influences the distribution function as well. If an inventory

management system takes responsibility of finished goods storage, then it has to provide storage facilities for higher levels of inventories. For example, seasonal products in many cases are produced all around the year to decrease investment in capital equipment. The stocks which come into existence are called anticipation stocks. But to produce or not to produce anticipation stocks is a manufacturing decision rather than a distribution decision.

### ***3.1 Types of inventory***

- **Raw Material Inventory**
- **WIP Inventory**
- **Finished Goods Inventory**
- **MRO Inventories.**

#### **Raw Material Inventory**

The materials, from which the final product of the company is made, are the raw materials. The material does not include any material that supports production; these materials are called indirect materials. But raw material is limited to the direct material (or) component that actually becomes a part of the final product. The steel used for automobile production is good example of a raw material kept in mind, though that the raw material of one industry is usually the finished product of another. Some of the raw materials may be available only seasonally, like cotton, sugar cane etc. There are certain raw materials which are governed by government control and quota system, like newsprint, coke etc.

The size of the raw material inventory is dependent upon factors such as

- internal lead time for purchase,
- supplier lead time,
- vendor relations,
- availability of raw materials,