

## ELEMENTS OF LOGISTICS MANAGEMENT

Logistics management consists of eight elements called wings of logistics. These are discussed in a nutshell below.

### 1. Customer Order Processing

#### Flow of Actions

1. Filling up the order form
2. Deciding the specifications of the product
3. Deciding the quality check list of the product
4. Deciding the delivery schedule
5. Deciding the location of delivery

#### Important Factors

1. Cost of order processing
2. whether the company is capable of producing a component
3. Detailed list of specifications

#### Techniques

1. Electronic data Interchange (EDI)
2. E-ERP or CPFR
3. Web portal

### 2. Location Analysis

#### Flow of Actions

1. Cost of transportation of raw materials and finished goods
  - Proximity to suppliers
  - Proximity to customers
2. Availability and type of land
3. Availability of secondary resources
4. Availability of desired manpower at affordable cost
5. Communal harmony
6. Governmental regulation and taxation

#### Important Factors

1. Cost of operations as a percentage of sales
2. Shelf life of product

### **3. Inventory Control**

#### Flow of Actions

1. On hand inventory analysis
2. Communicating the quantity, quality and timing of material with the supply points.
3. Getting the material of right quality, quantity and at right time

#### Important Factors

1. Inventory control at planning stage
2. Lead time
3. Cost vs. importance of raw material

#### Techniques

1. DRP and replenishment order control
2. Fixed order interval system
3. Economic order quantity with ROP system
4. Selective inventory control (ABC, VED, FSN analysis etc.)
5. Order forecasting using statistical tools

### **4. Material Handling**

#### Flow of Actions

1. Type of material (Business significance like raw material, finished goods etc.)
2. Material handling requirements of the material (Fragile, inflammable)
3. Cost ratio of material handling to material cost.
4. Material default location, identification and traceability

#### Important Factors

1. Material breakage
2. Pilferage
3. Cost of material handling
4. Number of handlings

#### Techniques

1. Operational research
2. Material flow analysis
3. Computerized material retrieval system
4. ASRS (Advanced Storage & Retrieval System)

## **5. Packaging**

### Flow of Actions

1. Packaging requirement for the material (Refrigeration, Fragile etc.)
2. Primary packaging
3. Secondary packaging
4. Cost of packaging
5. Transportation requirement for packaging (Vibration proof, water or moisture tight)

### Important Factors

1. Protection to product
2. Holding the product
3. Communicating the message to customers
4. Customer requirement for packaging
5. Reverse logistics for packaging
6. Recycling of packaging material
7. Cost of packaging

### Techniques

1. Standardized box packaging
2. Containerization of packaging
3. Direct part marking
4. ISO 14001
5. Recycling of packaging materials
6. Reusable packaging materials
7. Eco-friendly packaging materials
8. Bar coding
9. Bumpy bar coding
10. GPS tracking system
11. RFID

## **6. Transportation**

### Flow of Actions

1. Mode of transportation
2. Cost of product
3. Speed of transportation
4. Ambience requirement of material (Refrigeration, Vacuum)
5. Cost of transportation
6. Urgency of the product to customers

### Important Factors

1. Urgency of the product

2. Cost of product
3. Cost of transportation

#### Techniques

1. Containerized transportation
2. Cool Chain Transport (Refrigerated Vans/Containers)
3. Multi-modal Logistics
4. Milk Run Distribution systems
5. Cross Docking
6. Direct Shipment

### **7. Warehousing**

#### Flow of Actions

1. Location of the warehouse
2. Inventory level at the warehouse
3. Storage requirement of the product
4. Packaging and repackaging requirement of the product
5. Shelf life of the product

#### Important Factors

1. Availability of space
2. Availability of proper material handling systems
3. Strategic location
4. Packing and Re-packing facilities
5. Information and allied services

#### Techniques

1. Third Party Logistics
2. Third party Warehousing

### **8. Customer Service**

#### Flow of Actions

1. Contractual services offered to client
2. Type of customer service required for the product
3. Location of the service centre
4. Service level at the service centre
5. Cost of service vs. replacement

#### Important Factors

1. contractual requirement of customer service

2. Service quality
3. Reverse logistics

#### Techniques

1. AMC (Annual Maintenance Contracts) and free replacements
  2. Limited (free) trial period
  3. Guarantee & warrantee
  4. User clubs
  5. Help lines, toll free number, call centers
  6. CRM
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### **Quick Response Manufacturing (QRM)**

In today's world of competitive environment, one of the key success factors for manufacturing firms is speed—not only speed of delivery, but of concept, design and production. New opportunities open for those manufacturing firms, who can get products to market before the competition and success hinges on the ability to move quickly.

Quick response manufacturing (QRM) is a companywide strategy to cut lead times in all phases of manufacturing and office operations. It can bring the manufacturing firm's products to market more quickly and secure its business prospects by helping to compete in a rapidly changing manufacturing arena.

QRM will not only make the manufacturing firm more attractive to potential customers; it will also increase profitability by reducing non-value-added time, cutting inventory and increasing return on investment.

#### Benefits of QRM for the manufacturing firm

- Decreases the manufacturing costs
- Increases the market share
- Fills customer orders faster
- Boosts product quality
- Introduces new products rapidly
- Eliminates waste and inefficiency
- Secures the manufacturing future of the firm

Thus we see that even though it is imperative to apply lean manufacturing to any manufacturing firm, the manufacturing world is moving towards agile manufacturing and quick response manufacturing which is the next step for survival in this competitive era. But to approach agile manufacturing and quick response manufacturing, the company requires to be using lean manufacturing methods, which is a starting point. Agility can be built only from a firm foundation. Hence, the focus of this project is on lean.

#### **KEY CONCEPTS IN LEAN MANUFACTURING**

As we have already seen, lean manufacturing is a concept which looks very simple but its actual implementation would become difficult if certain basic concepts are not understood properly by an organization going for the implementation of Lean Manufacturing.

## **Kanban System**

The kanban system is an information system to harmoniously control the production quantities in every process. It is a tool to achieve just-in-time production. In this system what kind of units and how many units needed are written in a tag-like card called kanban. The kanban is sent to the people of the preceding process from the subsequent process. As a result, many processes in a plant are connected with each other. This connecting of processes in a factory allows for better control of necessary quantities for various products. The kanban system is supported by the following:

- Smoothing of production
- Reduction of set up time design of machine layout
- Standardization of jobs
- Improvement activities
- Autonomation

A kanban is usually card put in a rectangular vinyl envelope. Two kinds are mainly used: withdrawal kanban and production-ordering kanban. A withdrawal kanban details the kind and quantity of product which the subsequent process should withdraw from the preceding process, while a production-ordering kanban specifies the kind and quantity of the product which the preceding process must produce. These cards circulate within Toyota factories, between Toyota and its many co-operative companies, and within the factories of co-operative companies. In this manner, the kanban can contribute information on withdrawal and production quantities in order to achieve just-in-time production.

## **Autonomation**

In order to realize just-in-time perfectly, 100 per cent good units must flow to the prior process, and this flow must be rhythmic without interruption. Therefore, quality control is so important that it must coexist with the just-in-time operation throughout the kanban system. Autonomation means to build in a mechanism a means to prevent mass production of defective work in machines or product lines. Autonomation is not automation, but the autonomous check of abnormality in the process.

The autonomous machine is a machine to which an automatic stopping device is attached. In Toyota factories, almost all the machines are autonomous, so that mass-production of defects can be prevented and machine breakdowns are automatically checked. The idea of Autonomation is also expanded to the product lines of manual work. If something abnormal happens in a product line, the worker pushes stop button, thereby stopping his whole line.

## **Two-bin System**

### The Working of the System

To begin with, the stock from the first bin is consumed. The emptying of first bin indicates that the stock has reached ROL and the replenishment action is initiated. The quantities in the second bin are consumed during the replenishment period. This system reduces the work involved in record keeping and entering (clerical) errors.

Two containers of inventory; reorder when the first is empty, use the contents of the second until order received.

This system operates on reorder level (R.O.L.) system and it physically segregates the stock of entire items into two bins. The second bin contains quantity equal to R.O.L. i.e.  $(LC + S)$  and it means to satisfy demand during the replenishment period. The first bin contains the quantity  $= (Q - LC)$  to satisfy demand between the receipt of materials and placing the next order.  $LC$  is the lead time consumption.  $Q$  is the order quantity.

$S$  = Safety stock

$L$  = Lead time

$C$  = Consumption rate

$Q$  = Reorder quantity

### **JUST IN TIME (JIT)**

JIT is a Japanese management philosophy, which has been applied in practice since the early 1970s in many Japanese manufacturing organizations. It was first developed and perfected within the Toyota manufacturing plants by Taiichi Ohno as a means of meeting consumer demands with minimum delays. Taiichi Ohno is frequently referred to as the father of JIT.

Toyota was able to meet the increasing challenges for survival through an approach that focused on people, plants and systems. Toyota realized that JIT would only be successful if every individual within the organization was involved and committed to it, if the plant and processes were arranged for maximum output and efficiency, and if quality and production programs were scheduled to meet demands exactly.

JIT manufacturing has the capacity, when properly adapted to the organization, to strengthen the organization's competitiveness in the marketplace substantially by reducing wastes and improving product quality and efficiency of production.

There are strong cultural aspects associated with the emergence of JIT in Japan. The Japanese work ethic involves the following concepts.

- Workers are highly motivated to seek constant improvement upon that which already exists. Although high standards are currently being met, there exist even higher standards to achieve.
- Companies should focus on group effort, which involves the combining of talents and sharing knowledge, problem-solving skills, ideas and the achievement of a common goal.
- Work itself takes precedence over leisure. It is not unusual for a Japanese employee to work 14-hour a day.
- Employees tend to remain with one company throughout the course of their career span. This allows the opportunity for them to hone their skills and abilities at a constant rate while offering numerous benefits to the company.
- These benefits manifest themselves in employee loyalty, low turnover costs and fulfillment of company goals.

From above it is very clear what it needs to implement JIT successfully. In fact it also suggests the critical reasoning behind the fact that why in India JIT is not 100 per cent followed. One more significant thing to be considered here is the correct interpretation of JIT. JIT is more of a manufacturing and waste elimination philosophy than commodity purchasing technique. It originally referred to the production of goods to meet customer demand exactly, in time, quality and quantity, whether the customer is the final purchaser of the product or another process further along the production line.

It has now come to mean producing with minimum waste. Waste is taken in its most general sense and includes time and resources as well as materials. There are seven types of waste namely:

- Waste from overproduction
- Waste of waiting time
- Transportation waste
- Processing waste
- Inventory waste
- Waste of motion
- Waste from product defects

#### Elements of JIT System

Successful JIT system is the logical outgrowth of the combination of the following practices:

- Continuous improvement
- Attacking fundamental problems-anything that does not add value to the product
- Devising systems to identify problems
- Striving for simplicity-simpler systems may be easier to understand, easier to manage and less likely to go wrong
- A product-oriented layout-produces less time spent in moving of materials and parts
- Quality control at source-each worker is responsible for the quality of their own output
- Poka-yoke: foolproof tools, methods, jigs etc. to prevent mistakes
- Total productive maintenance-ensuring machinery and equipment functions perfectly when it is required, and continually improving it
- Good housekeeping-workplace cleanliness and organization
- Set up time reduction-increases flexibility and allows smaller batches
- Ideal batch size is 1 item per batch, i.e. single piece flow
- Multi-process handling-a multi-skilled workforce has greater productivity, flexibility and job satisfaction
- Leveled/mixed production-to smooth the flow of products through the factory
- Kanban- simple tools to 'pull' products and components through the process
- Jidoka (Autonomation)-providing machines with the autonomous capability to use judgment, so workers can do more useful things than standing watching them work
- Andon {trouble lights}-to signal problems to initiate corrective action



### Benefits of JIT Systems

JIT system has a number of benefits, few major are mentioned below:

- Reduced levels of in-process inventories, purchased goods, and finished goods.
- Reduced space requirements.
- Increased product quality and reduced scrap and rework.
- Reduced manufacturing lead times.
- Greater flexibility in changing the production mix.
- Smoother production flow with fewer disruptions.
- Worker participation in problem solving.
- Pressure to build good relationships with vendors
- Increased productivity levels and utilization of equipment.

It can be said in summary that JIT is the management philosophy, which emphasizes on the waste elimination as well as vendor integration to create certainty in the material planning process, which ultimately results into no inventory; and hence inventory control means to follow JIT.

### **VENDOR MANAGED INVENTORY (VMI)**

VMI can be defined as:

It is a streamlined approach to inventory and order fulfillment. With it, the supplier and not the retailer, is responsible for managing and replenishing inventory. This is done by using EDI, by electronic transfer of data over a network. It can also be seen as a mechanism where the supplier creates the purchase orders based on the demand information exchanged by the retailer/customer.

Vendor Managed Inventory (VMI) is basically evolved to facilitate the operations at retail stores. It involves a continuous replenishment program that uses the exchange of information between the retailer and the supplier to allow the supplier to manage and replenish merchandise stock at the store or warehouse level. In this program, the retailer supplies the vendor with the information necessary to maintain just enough merchandise stock to meet customer demand. This enable the supplier to better project and anticipate the amount of product it needs to produce or supply. The manufacturer has access to the suppliers' inventory data and is responsible for generating purchase orders. VMI was first applied to the grocery industry, between companies like Procter & Gamble (supplier) and Wal-Mart (distributor). But if applied properly, VMI can provide the benefits of smoother demand, increased sales, lower inventories and still reduced costs of lost sales to the other industries.

### Benefits of VMI

#### *1. Dual Benefits*

1. Data entry errors are reduced due to computer-to-computer communications. Speed of the processing is also improved.

2. Both parties are interested in giving better service to the end customer. Having the correct item in stock when the end customer needs it, benefits all parties involved.
3. A true partnership is formed between the manufacturer and the distributor. They work closer together and strengthen their ties.

## 2. Supplier Benefits

Reduced inventory: This is the most obvious benefit of VMI. Using the VMI process, the supplier is able to control the lead time component of order point better than a customer with thousands of suppliers they have to deal with. Additionally, the supplier takes on a greater responsibility to have the product available when needed, thereby lowering the need for safety stock. Also, the supplier reviews the information on a more frequent basis, lowering the safety stock component. These factors contribute to significantly lower inventories.

1. Reduced stock outs: The supplier keeps track of inventory movement and takes over responsibility of product availability resulting in a reduction of stock outs, thereby increasing end-customer satisfaction.
2. Reduced forecasting and purchasing activities; as the supplier does the forecasting and creating orders based on the demand information sent by the retailer, the retailer can reduce the costs on forecasting and purchasing activities.
3. Increase in sales: Due to less stock out situations, customers will find the right product at right time. Customer will come to the store again and again, thereby reflecting an increase in sales.
4. Planning and ordering cost will decrease due to the responsibility being shifted to the manufacturer.
5. The overall service level is improved by having the right product at the right time.
6. The manufacturer is more focused than ever in providing great service.

On a whole, vendor managed inventory reduces transaction costs such as:

### Purchasing

- Speeds transactions
- Streamlines communication between customer and supplier
- Eliminates paper-to-computer data entry
- Improves data accuracy
- Frees up staff to work on more productive activities

### Inventory Management

- Delivery as needed cuts storage
- Helps you reduce inventory levels
- Reduces inventory obsolescence
- Improves inventory turns
- Improves fill rates
- Decreases lost sales

#### Receiving

- Advance Ship Notice speeds up receiving
- Bar Coding cuts warehousing costs

#### Error Reduction

- Data entry mistakes are avoided
- Information flow is continuous

### 3. Manufacturers Benefits

1. Improved visibility results in better forecasting: Without the VMI process, suppliers do not exactly know how their customers are going to place orders. To satisfy the demand, suppliers usually have to maintain large amounts of safety stocks. With the VMI process, the retailer sends the POS data directly to the vendor, which improves the visibility and results in better forecasting.
2. Reduces PO errors and potential returns: As the supplier forecasts and creates the orders, mistakes, which could otherwise lead to a return, will come down.
1. Improvement in SLA: Vendor can see the potential need for the item before it is actually ordered and right product is supplied to retailer at right time improving service level agreements between retailer and supplier.
2. Encourages supply chain cooperation: Partnerships and collaborations are formed that smooth the supply chain pipeline. Visibility to the distributor's point of sale data makes forecasting easier.
3. Promotions can be more easily incorporated into the inventory plan.
4. A reduction in distributor ordering errors (which in the past would probably lead to a return).
5. Visibility to stock levels helps to identify priorities. Before VMI, a manufacturer has no visibility to the quantity and the products that are ordered. With VMI, the manufacturer can see the potential need for an item before the item is ordered.

### JIT - II

Lance Dixon, the father of JIT-II describes it, as "This is the ultimate partnership program for compatible customers and suppliers, because it is the next logical step in the application of the management cycle to the value chain, through the management of time within the supply chain. It represents the use of alignment and mobilization strategies with suppliers using in-plant vendor representatives to achieve breakthrough changes".

JIT system was based upon the synchronized planning between the buyer's needs and the supplier's production capabilities. It will not produce any breakthroughs or generate any major organizational transformation. It will result into proper materials control across organizations. JIT-II can be regarded as a major catalyst for the productive change across organizations and qualifies a toy component of the macro logistics management model. In other words, we can say that JIT system assures the un-interrupted incoming material supply as per demand, whereas JIT-II ensures the un-interrupted production from manufacturing lines.

In fact JIT-II eliminates the need for the sales planning activities from supplier organization and the purchasing planning activities from the buyer organization, which were carried out independently. Both the activities are carried out simultaneously in JIT-II environment. This results into more integrated and realistic plans to enable achieving targets. Typically, it automatically and naturally produces the necessary element of coordination within two organizations without "follow-up".

The concept of JIT-II was developed by the BOSE Corp as a time saving, cost-cutting approach to partnering with suppliers using the concept of concurrent engineering at its source. It is based upon a mutual trust relationship here the supplier representative is empowered to use the company's purchase orders to place orders, which in theory replaces the purchaser and the supplier's salesperson. In practice, the supplier representative is brought into the plant on a full-time basis. This person is allowed to attend any product design meetings for his/her product and has full access to all relevant facilities, personnel, and data. Purchasing staff is freed up from all the paperwork and administrative tasks, allowing them to cultivate other skills such as negotiating and sourcing. PO placement and communication is improved; time is saved; material cost reduction is realized.

The benefits are substantial for both the customer and the supplier. JIT-II provides a natural foundation for EDI, effective paperwork, and administrative savings. Material costs are reduced on an ongoing basis. Supplier personnel work onsite and perform various planning and buying duties as well. Because supplier personnel interface daily, increased insight leads to fewer schedule-change surprises. This results in reduced inventory as the supplier plans directly from the customer's MRP system on a real time basis. Most remaining time is spent working with design engineering staff, thus maximizing the opportunities of concurrent engineering and cost reduction.

JIT-II makes an old negative "backdoor selling" into a positive. The companies selling directly into design engineering have been selected jointly by purchasing and engineering management.

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## **DISTRIBUTION STRATEGIES**

Distribution strategies can be of the following types:

- Cross docking
- Milk runs
- Direct shipping
- Hub and spoke model

### ***Cross Docking***

Traditional warehouses move materials into storage, keep them till they are needed and then move them out to meet the customer demand. Cross docking co-ordinates the supply and delivery so that the goods arrive at the receiving area and are transferred straight away to the loading area, where they are put into delivery vehicles. In other words, Cross docking is the movement of materials from the receiving docks directly

to the shipping docks. It is said, "Cross docking is a flow through concept and we don't want product to stop anywhere, because space, brick and mortar is getting very expensive these days/'

Goods do not need to be placed in storage, creating a significant cost savings in inventory and material handling. Cross docking helps reduce direct cost associated with excess inventory by eliminating unnecessary handling and storage of product. Fewer inventories means less space and equipment required for handling and storing the products. This also means reduced product--damages and product obsolescence. Thus, the step of filling a warehouse with inventory before shipping it out is virtually eliminated. Cross docking shifts the focus from "supply chain" to "demand chain". For example, stock coming into cross docking centre has already been pre-allocated against a replenishment order generated by a retailer in the supply chain. Cross docking helps retailers streamline the supply chain from point of origin to point of sale. Cross docking also encourages electronic communications between retailers and their suppliers.

#### Two Basic Forms Of Cross Docking

1. Basic Cross Dock: In this form the packages are moved directly from the arriving vehicles to the departing ones. This form of cross docking does not need a warehouse and a simple transfer point is enough.
2. Flow Through Cross Dock: In case of the flow through concept, when the materials arrive and they are in large packages, these packages are opened and broken into smaller quantities, sorted, consolidated to deliver them to different customers and transferred to vehicles.

Cross docking can develop to a phase where nothing actually moves through a warehouse. The stock kept within vehicles is referred to as stock on wheels. Nowadays wholesalers use the method of drop-shipping, where they do not keep the stock themselves, but coordinate the movement of goods from the upstream suppliers to the downstream buyers.

#### Benefits of Cross Docking

1. Cross docking helps to improve the speed of flow of the products from the supplier to the store\*.
2. It helps to reduce the costs as:
  - The labour is removed from the job of storage (warehouses).
  - It helps eliminate the two most expensive distribution operations i.e. warehousing and storage.
3. Cross docking helps to reduce the amount of finished goods inventory that is required to be maintained as safety stock.
4. Cross docking reduces costs and hence helps to save money.

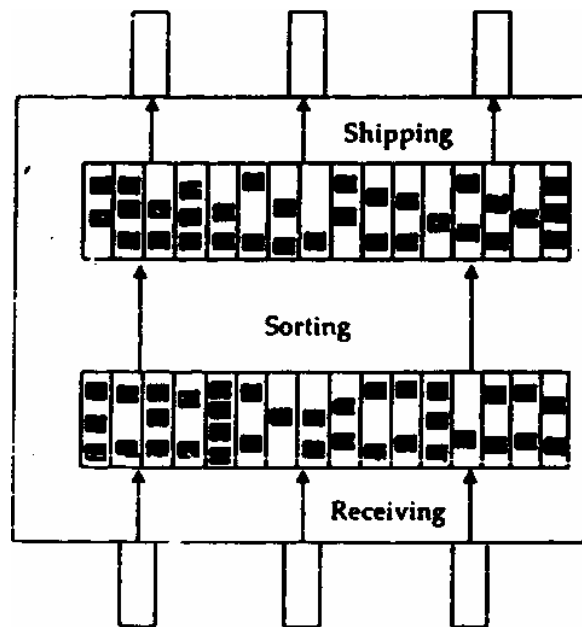
#### Constraints

1. Cross docking requires a strong IT base and real-time information sharing facilities, e.g. (Bar codes on cartons).

2. Cross docking is appropriate for products with large, predictable demands and also requires that the distribution centers should be set up such that the benefits of economies of scale in transportation can be achieved on both the inbound and the outbound side.
3. It requires a great degree of coordination and synchronization between the incoming and "outgoing shipments which, in turn, relies on better information and planning.
4. Further the product availability, accuracy and quality are also critical. The company can't force other members of the supply chain to incur additional costs or efforts so as to take the benefits of cross docking.

### How Cross Docking Works

On receiving goods workers put them in lanes corresponding to the receiving doors. A second team of workers sort the goods into shipping lanes from which a final team loads them into outbound trailers. This is illustrated in Figure –



### Milk Runs

A milk run is a route in which a truck either delivers product from a single supplier to multiple retailers or goes from multiple suppliers to single retailer as shown in Figures (a) and (b). In other words, in a milk run, a supplier delivers directly to multiple retail stores on a truck or a truck picks up deliveries for many suppliers of the same retail store. The main job of the supply chain manager is to decide on the routing of each milk run.

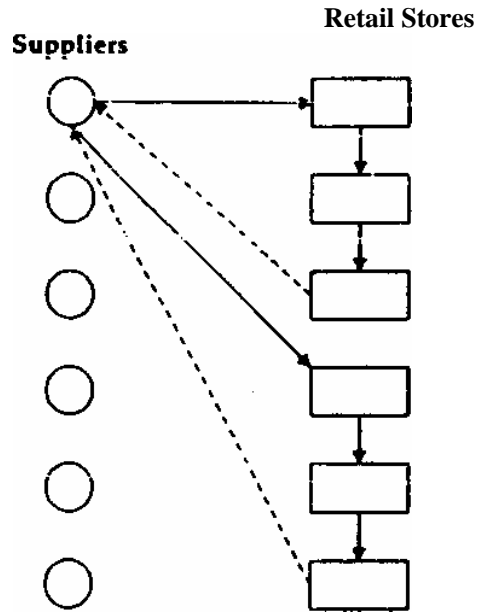


FIGURE (a) Milk runs from single supplier to multiple retailers.

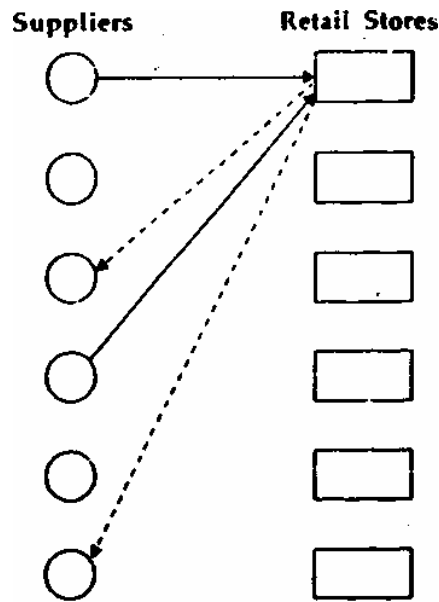


FIGURE (b) Milk runs from multiple suppliers to single retailer.

### Benefits of Milk Runs

1. Reduces cost: Milk runs help to reduce the transportation costs by consolidating shipments to multiple stores on a single truck. The use of milk runs allows deliveries to multiple stores to be consolidated on a single truck, resulting in a better utilization of the truck and somewhat lower costs.
2. Proximity of suppliers: The use of milk runs is helpful if very frequent small deliveries are needed on a regular basis and either a set of suppliers or a set of retailers is in geographical proximity.
3. Reduces inventory: Milk runs also help to reduce the amount of inventory need to be kept as safety stock in the warehouses.

One of the major challenges faced by the milk run system of distribution is the high degree of coordination and synchronization required among the members of the supply chain.

### *Direct Shipping*

Direct shipping refers to the method of distribution in which the goods come directly from the suppliers to the retail stores as shown in Figure. In case of direct shipment network, the routing of each shipment is specified and the supply chain manager only needs to decide on the quantity to ship and the mode of transportation to use. This system eliminates the need for the intermediate facilities that are otherwise required, e.g. warehouses and distribution centers. The products that are generally distributed through the method of direct shipping are certain perishable items, high volume goods, high bulk items and specialty products

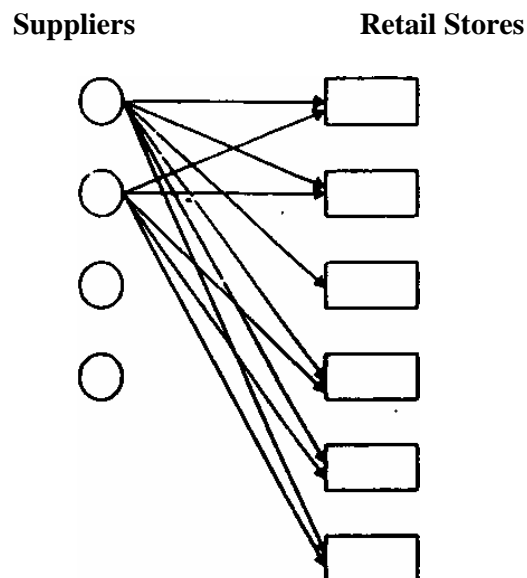


FIGURE Direct shipment network.



### Benefits of Direct Shipment

1. Elimination of intermediaries: The major advantage of direct shipment network is the elimination of intermediate warehouses and the simplicity of its operation and coordination.
2. Saves time: It saves a lot of time as the time required for distribution of goods from the supplier to the retail store would be short because each shipment goes direct.
3. Less damage: As the goods move directly from the supplier to the retailer there is less handling of the products as a result there is less product damage.
4. Improved accuracy: Since the distribution is direct the invoices match receiving records, correct products enter the store etc.

### Challenges

1. Large retail stores: The direct shipment network is justified if the retail stores are large enough. With the small size of retail stores the direct shipment network tends to have high costs.
2. Higher costs: Due to the system of direct distribution the costs of transporting the goods may be higher than other systems of distribution.
3. Hassle for store personnel: The shipment directly from the supplier to the retailer poses a lot of hassles for the store personnel e.g. more deliveries, paperwork, loading & unloading etc.
4. No safety stock: If there is certain problem in the shipment of goods from the supplier, e.g. wrong goods are transported; goods are damaged while shipment etc. maintenance of no supply stock creates a problem.

### ***Hub and Spoke Model***

In case of the hub and spoke model the distribution model's hub is the location that holds inventory for a large region, with each spoke leading to a smaller distribution centre, which houses inventory for a smaller region. The main driver of the hub and spoke model is the proximity to the customer, with the goal being to supply to a maximum amount of customers in a minimum amount of time.

In today's distribution environment, however, this goal can be attained in many cases without a hub and spoke operation, which has a very high overheads. Hub and spoke, these days, is often restricted to fulfilling the just-in-time needs of heavy manufacturing industries. For example, if a company expands its operations, its suppliers may move to the nearby areas so as to supply it more efficiently. In this case, the company that expands is the hub and the suppliers are its spokes.

The type of product to be distributed, for instance, may necessitate a hub and spoke operation. The products that cannot be air freighted are mostly distributed through the hub and spoke model.

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### Example

A leading example of the hub and spoke model of distribution is the Nicholas Piramal Group. Nicholas Piramal is using the hub and spoke model to reduce the finished goods inventory. Currently, the stock holding at the carrying and forwarding agent

level is 30 days. Once all the hubs are set up, the response time will reduce to 10 to 2 days. Using the system, the inventory at the carrying and forwarding agent level would go down to 7 days and at the hubs level would also be 7 days bringing down the overall inventory level to 14 days. The company has already set up 2 hubs and would be putting up 1 more. Some high volume products would be going directly to the carrying and forwarding agent. The problem to get full truckload can be solved by supplying to the hubs.

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### **Types of Warehouses**

Companies might own private warehouses or rent space in public warehouses or both. Both have their advantages and disadvantages. Owning a private warehouse brings more control, ties up capital, and is less flexible if locations change.

On the other hand, public warehouses charge for rented space, provide additional services for inspecting, packaging, shipping and invoicing goods but at a cost and offer wide choice of locations and warehouse types.

Basic types of warehouses are:

- **Bonded warehouses:** Warehouses which are bonded under the Customs and Excise Act and Municipal Corporation regulations, facilitating deferred payment of customs, excise or octroi duty.
  - **Field warehouses:** Field warehouses are those which are managed by a public warehousing agency in the premises of a factory or company which needs the facility for borrowing from a bank against the certification of goods in storage or in process by an independent professional warehouseman.
  - **Cold storages:** Cold storage facilities are provided for perishables against payment of storage for the space utilized by different parties.
  - **Agricultural warehouses:** Used for storing agricultural produce grown in a certain area.
  - **Distribution warehouses:** Ones located close to the manufacturing concerns or consuming areas. These are designed to move goods rather than just store them. They are large and automated warehouses designed to receive goods from suppliers, take orders and deliver goods to customers.
  - **Buffer storage warehouses:** These are built at strategic locations with adequate transport and communication.
  - **Facilities:** Used for storing food grains or fertilizers etc. by or for the government for easy marshalling and supply to various far-off or nearby consuming areas in response to the orders of the government or government agencies.
  - **Export and import warehouses:** They are located near the ports from where international trade is undertaken.
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### **THIRD-PARTY LOGISTICS (TPL/3PL)**

Third-party logistics refers to the concept of outsourcing the logistics and distribution of a manufacturing or service firm to a logistics service provider so that the manufacturing company can focus on its core competencies of new product development manufacturing them and marketing the products.

The logistics and distribution activities add up to almost around 5 per cent to the cost to thereby increasing the final cost of the product. In addition to this the inventory costs add around 15 per cent to the cost of the product. To increase operational efficiency it is necessary for firms to cut these costs to remain competitive. So manufacturing firms outsource these activities to LSPs which in co-ordination with the manufacturing firms' needs control inventory and reduce costs.

Third party logistics is the activity of outsourcing activities related to logistics and distribution. The 3PL industry includes Logistics Solution Providers (LSPs) and the shippers whose business processes they support. Companies opt for third party logistics for the following reasons:

- Improved strategic focus: Using 3PLs companies can concentrate on their core tasks and improve customer satisfaction.
- Resource constraints.
- Lowered costs: According to research reports companies can reduce their inventory management costs by around 15-30 per cent. Also 3PL service providers invest large sums of money in developing processes that aim to achieve logistical excellence, which are unavailable to other companies.
- Expansion of markets: Outsourcing logistical activities to 3PLs allow companies to get into new businesses, new markets or a new channel of distribution quickly and with a limited outlay of cash.
- For more professional and scientific approach to logistical problems.
- For improvement in service levels with improved response time.
- For efficient management of inventory resulting in better utilization of working capital.
- Increased flexibility: A 3PL contract provides for relatively short term commitments as compared to building and maintaining the same resources by the company itself, thus freeing up resources for other uses.

In addition to the logistics and distribution functions, 3PLs also perform functions such as fund collection, providing information of goods movement consumer demographics, warehousing and value-added activities such as assembling, packaging, flow of funds and reverse logistics.

#### ***The Evolution of 3PLs***

The evolution of 3PLs is closely coupled along with the evolution of SCM practices. In the era of mass production, the role that LSPs performed was confined only to the flow of goods from point of origin to the point of consumption. These types of LSPs can be called as the first generation LSPs whose primary functionality was that of transportation -activity.

With increased awareness the manufacturing firm began to closely collaborate with the LSPs to handle both inward as well as outward movement of goods and some sharing of information resulting in the birth of second generation LSPs. However the

LSPs were still treated at an arm's length and with some suspicion. The suspicion arose from the manufacturing firms' fears that the LSPs may provide information related to the suppliers and consumers to their competitors. However, with the increased use of information technology that increased the visibility of goods the manufacturing company and the LSPs have come a long way to improve their relationship and now work closely to improve the business of the firm. The LSPs work in tandem with the manufacturing firm to meet their supply chain activities and help manufacturing firms tap new markets because of their efficient and timely distribution of products. The new breeds of LSPs even help the manufacturing firms in designing their SCM strategy and in some cases the IT and communication infrastructure have been closely integrated allowing both the LSPs and the manufacturing firm to share information and aid in better decision-making.

### ***The Infrastructure Required for a 3PL***

The 3PL should have adequate infrastructure for servicing its customer requirements. The following type of infrastructure is a prerequisite for a good 3PL.

1. Warehouse
2. Fleet of vehicles
3. Hardware and software to take care of information needs
4. Advanced material handling capabilities
5. Good team of consultants
6. Trained manpower
7. Reach in terms of geography

### ***Selecting a 3PL Service Provider***

Though manufacturing or even service companies stand to gain a lot from outsourcing their logistics activities to 3PLs, the returns from such a relationship have not been commensurate with the expected returns. This makes many critics to question the validity of using a 3PL service provider, in turn making the process of selection and evaluating the 3PL all the more important.

#### **Steps While Considering a 3PL Service Provider**

The unique challenges posed by the company when they outsource to a 3PL makes it worthwhile for companies to answer a few questions for making their relationship with the 3PL a success. The manufacturing company should consider the following points:

- **Knowing where to go:** Companies should define their logistics management goals and attempt to visualize their organization status after they have outsourced their logistics activities. Many companies even employ outside consultants to gauge whether there is a need of a 3PL alliance. The consultants help the company to narrow down to a list of 3PLs and identify their would-be partners.
- **Knowing the needs and objectives:** The manufacturing company should know clearly its objectives for outsourcing their logistical activities and then attempt to visualize the organization after it has outsourced their logistical activities. Knowing the needs also helps the companies in selecting a 3PL that best fits in

to their requirements. Setting objectives of the outsourcing function should be a cross functional activity with participation of key personnel from all critical departments of the company such as information systems, finance, marketing, production, field staff, human resources and supply chain department.

The next step is to send out request or proposals or request for quotes from the short-listed LSPs. There are several factors a company needs to evaluate before setting up an alliance with LSPs. One of them is to know its objective in measurable quantities and clarifying the same to the short listed firms. The company also considers the value-added activities that they expect from the service provider. A major consideration at this point is that the company should determine the need of system integration with that of the LSP.

After getting proposals or quotes from LSPs the companies should do their due diligence on the LSPs capacity and operational performance. Each LSPs should also be evaluated on their long-term commitments to improve operational performance. The LSP should also have some sectoral expertise and the company can find out if the LSP has any client in the same sector. The background search on the 3PL provider can give a lot of insights about the LSP's performance in the above stated areas.

### ***3PL Implementation***

Once the company has selected the service provider it must ensure that all the parties involved in the transaction are integrated and coordinated properly for effective implementation before signing the contract the company must make sure that both the parties clarify the requirements properly so that it does not lead to ambiguity. Both the parties should be clear about the service and performance expectations of each other from the contract.

It is also necessary to ensure that the process of employing a 3PL has proper support from the top management, because employing a LSP implies a major change in the hierarchy and culture of the organization. In other words we can say that employing a 3PL means that the visible face of the organization has changed to the 3PL. This requires a major change in the thinking of the marketing and sales department as well as the removal of the in-house logistics staff and so must be dealt with utmost sensitivity.

### **The Implementation Process**

After the contract has been finalized the firms must begin to implement the contract within both the organizations. For implementation there should be a comprehensive plan and periodic checks should be conducted to ensure that the implementation is on track. The review process is very crucial as any minor aberration in the decided course of action could throw the whole implementation process off track resulting in huge disruptions.

Communication plays a crucial role in the whole process and a mix-up in the communication channels could result in loss of data and subsequently loss to the manufacturing firm. This may eventually destroy the mutual trust between the two parties resulting in the failure of the relationship. At this juncture it is important that both parties share their information freely.

For effective communication to be ensured in the manufacturing as well as 3PL it is helpful to maintain a one point contact who can effectively co-ordinate the interaction

between both parties. This contact may be an account executive on both sides who ensures that strategies in both the organizations are aligned. In addition to the account executive an account manager may also be hired to manage the relationship. For day-to-day activities there should be a team of support personnel.

In addition to all this the firm outsourcing to the 3PL should have a contingency plan in place, in case negotiations with the service provider breakdown due to any reasons.

### ***Measuring and Evaluating Performance***

After the whole structure has been put in place the manufacturing firm needs to realize that the service provider is an integral part of their business process and commit its resources to invest in long-term relationship. However, at the same time it must also realize that it needs to review the performance of the service provider as it does with any business unit within the organization.

The manufacturing company should review the performance of die 3PL based on the metrics of performance decided initially in the contract. The following are the metrics of evaluating a 3PL:

#### *Transportation*

- On-time shipment: Percentage of shipments that leave on the designated time/dale as against the total number of deliveries.
- On-time delivery: Percentage of shipments that reach the customer location on the designated date as against the total number of shipments.
- Transportation cost per mile: How much it cost to transport a unit per mite against the previous in-house process or against industry standards.

#### *Warehousing*

- Percentage of orders that the 3PL ships in exact quantity as against specified on the shipping order.
- Per unit cost of warehousing.
- Cost of warehousing including the overheads.
- Ability of moving the goods from one dock to another within specified time period.
- Number of cases handled per hour or per employee.
- Picking accuracy: Percentage of lines with errors vs. total number of lines.
- Order fulfillment.
- Item Fulfillment.
- Inventory accuracy: Number of errors in reporting inventory in warehouses.
- Loss and damage: Loss and damage resulting from contractor negligence.

#### *Cost*

- Service costs: The number of times the service provider meets the targeted reduction in costs.
- Cost reductions: Service provider initiatives to cut costs quarter to quarter.

#### *Quality*

- Reports: Ability of service provider to supply reports to manufacturing firm with the required information.
- Process improvement: Initiatives jointly developed by the manufacturing firm and the 3PL to improve process performance.

#### *Availability*

- Customer satisfaction: Customer satisfaction surveys for the customers serviced by, the 3PL.
- Handling routing: Excess /shortage of inventory in the warehouse indicating improper warehousing.

In addition to these quantifiable metrics there are some other factors that should also be considered while evaluating the 3PL. Some of these are listed below:

- Flexibility: Ability of the 3PL to make changes in the processes according to the requirements of the manufacturing company.
- Support of top management: The top management of the service provider plays a crucial role in making a commitment to a long-term relationship.
- Investments in infrastructure: The 3PL should also make considerable investments on the Information Technology and communication front.
- Financial stability: A 3PL contract calls for major investments by the service provider in the initial years for warehouses, fleets etc. and hence may not realize any gains in the first one or two years. Hence, the financial stability of the service provider is also crucial to the success of the alliance.

#### *Operations of Indian 3PLs*

The Indian 3PL industry is still in a stage of infancy as compared to their western counterparts. The major operators having a presence in India are as follows:

1. Gati
2. Transport Corporation of India Ltd.
3. Blue Dart Logistics
4. DHL Logistics
5. FedEx
6. AFL Logistics

There are many other foreign operators who provide services in India and who have come into the limelight. These players include Panalpina, Frans Maas, Excel Logistics, and Bax Global.

The typical activities that are performed by the 3PL operators in India include warehousing and transportation including full truck load and less than full truck load. Initially the outsourcing activities were only confined to transportation activities. However, there has been a change in the perspective of the outsourcing activities. The 3PL providers have moved from the role of transportation and are increasingly undertaking total supply chain activities for clients.

However, these activities are becoming increasingly commoditized and what differentiate one 3PL player from others are sectoral expertise and the value-added services they offer.

Value Added activities of 3PL: The value added activities of a 3PL service provide have seen them move from the role of a 3PL to operators offering financial services

for fund routing and also information centers to give information to clients regarding customer demographics.

### ***Blue Dart Logistics***

Blue Dart Logistics provides various e-business solutions to its customers for information flow and increasing the visibility of goods. Some of the e-commerce initiatives are given in Table

TABLE Some e-commerce initiatives of Blue Dart.

Sr. No.	Tools	Functionality
1	Track Dart	Track status of shipment
2	Mail Dart	Track shipments using mail
3	Location Finder	Find service location
4	Transit Time Finder	Check transit times for shipment
5	Billing	Receive invoices online
6	Schedule a Pickup	To schedule customer consignments picking
7	Waybill Generation	Generate a waybill for consignments
8	Image Dart	Tool for downloading proof of delivery

Some other value added-services that are offered are reverse logistics, kitting services, and custom clearances.

### ***Transport Corporation of India***

TCI is an umbrella organization that provides services in the field of supply chain management. It has other sister concerns such as TCI Seaways, TCI Logistics, XPS cargo and Transystem. The main services offered by TCI are in the area of consulting, transportation management services, warehousing services, IT and MIS reporting services and other value-added services.

The following are the value-added services offered by TCI:

1. Reverse logistics
2. PDI/COD services
3. Kitting services
4. Custom clearance services
5. E-logistics
6. Risk and tax facilitating management

### ***AFL Logistics Ltd***

AFL Logistics provides the following services in the field of international logistics, domestic logistics and supply chain management. It provides international logistics solutions through its alliance with DHL Logistics.

The following are the value added services provided by AFL Logistics Ltd.:



- Product Repair / Return Services
- Kitting / Pick and Pack
- Insurance, Sales & Octroi Management
- Multimodal Services
- Sales Promotion Management
- Collections & Banking Services
- Quality Assurance & Control Services
- MIS & Reporting

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## **FOURTH-PARTY LOGISTICS (4PL)**

Fourth-party logistics was a term coined by Accenture Consulting in the mid 90s. The term was coined as a result of an exhaustive survey carried out by the organization on customer satisfaction, which indicated that the customer expectations regarding costs by using 5FL service providers were not up to the mark. The survey also indicated that the balance of risk-and-reward on which the 3PL business model is based had tilted the rewards unjustly in favour of the 3PL service providers while the risks were borne by the client organizations. This was because of the fee-based model of outsourcing that the companies adopted that resulted in inflated costs of operations with increase in the outsourcing business. As a result the supposedly dynamic nature of the 3PL service provider had become a dynamic one.

To model a more dynamic relation Accenture coined the term 4PL with the following definition:

"An integrator that assembles the capabilities, technology and resources of its own organization and other organizations to design, build and run comprehensive supply chain solutions."

For a firm to be 4PL it must have exhaustive skills in investing and maintaining the infrastructure and resources that makes it the manager of multiple 3PL service providers crucial to the client organization.

However, the definition of 4PL was misinterpreted by many 3PLs who thought 4PL as a kind of 3PL plus service and began providing some value-added activities such as assembling, picking and then marketing themselves as 4PL providers.

### ***Key Components of a 4PL***

Four Key Components a 4PL Must Assemble

#### **1. CHANGE LEADER**

- Supply-chain visionary
- Multiple Customer relationship
- Deal shaper and maker
- Supply-chain re-engineers
- Project management
- Service, Systems and information integrator
- Continuous innovation

## 2. DECISION MAKERS

- Experienced logisticians
- Optimization engines and decision support
- Neutral positioning
- Manage multiple 3PLs
- Continuous improvement

## 3. INFORMATION

- IT System integration
- IT infrastructure provision
- Real-time data to information
- Convert data to information
- Provide info to point of need
- Technical support

## 4. ASSETS

- Transport asset provider
- Warehouse, cross-dock, property facility
- Manufacturing-outsourcing
- Procurement service
- Co-packing service

### The Architect/Integrator

The 4PL should be the instigator of continuous innovations that help in maximizing the use of 3PL service providers to the client organization. The process of innovation makes sure that the relationship between that of the 3PL and the client organization does not remain a static one and is evolving continuously for the benefit of the client organization. The change can come in process improvements or use of enhanced technology for efficient utilization of resources.-

### The Control Room

The control room is the brain and intelligence of the 4PL. It is the decision-making components and should consist of experienced logisticians. Ideally, the control room component should contain people from partner and client organizations who can enhance returns with their collective intellect.

### The Supply Chain Infomediary

The 4PL should have extensive resources and capabilities for collecting and disseminating information to various partner organizations. It must use enhanced technologies like GPS, GIS to increase visibility of goods. The 4PL provider must also possess capabilities to integrate the disparate technologies of various 3PL and the client organization so that sharing of information is complete. The 4PL is also the nodal agency for converting raw data into meaningful information. An emerging trend for information sharing is the use of web-based tools.

## The Resource Provider

Finally, the 4PL provider must also provide some resources that are critical to the functioning of the conventional supply chain solutions. These resources include warehousing, packaging etc.

### ***Technology Component of 4pl***

Though technology is not the only component of a 4PL provider, it is one of the key components of disseminating information for being responsive to changes. And being dynamic is one of the most important challenges of a 4PL service provider.

#### *GPS Technology*

GPS, global positioning system, is the only technology that can be used for determining the position of any object on Earth, with a high amount of accuracy and in any weather.

#### Key Components of GPS

GPS uses 3 main elements-space segment, user segment and the control segment. GPS uses 24 satellites that orbit in space 11,000 nautical miles above the earth, which comprises the space segment. The user segment consists of receivers, which can be hand held or mount on a car. The control segment consists of five ground stations, located around the world, which ensures the proper working of the satellites.

#### Use of GPS in Fleet Management

The use of GPS in fleet management helps to:

- Know whether the vehicle has traveled out of an approved area, or entered a fenced-off zone.
  - Know how long the vehicle has spent in various places or in transit each working day.
  - Determine vehicle and/or cargo status according to external inputs.
  - Determine how long the vehicle has been in use.
  - Eliminate unauthorized use of vehicles.
  - Ensure that company vehicles are used legally.
  - Determine the location of the stolen asset in case of theft.
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## **BENCHMARKING: INTRODUCTION AND CONCEPT**

A benchmark is a standard of performance. Benchmarking helps organizations identify standards of performance in other organizations and to import them successfully to their own. It allows organizations to discover where they stand in relation to others. By identifying, understanding, comparing, and adapting one's own organization with the outstanding practices and processes of others, an organization can target problem areas, set levels of performance, and identify solutions to improve results. A public sector organization can borrow the best practices of the private sector, and vice versa.

Organizations that accomplish a particular activity at the highest value, i.e. at the lowest cost and/or quality or efficiency are considered best-in-class. In determining what qualifies as world class, benchmarking asks the question: "who are we now, and who do we want to be?" The best benchmarking efforts not only match the performance of others but also motivate to exceed it.

Typically performed by internal personnel who already have a thorough knowledge of the process under review, benchmarking looks beyond performance measures and cost ratios. It considers the total organizational impact.

In benchmarking with comparison to others, an organization:

- Determines how leading organizations perform specific processes
- Compares their methods to its own
- Uses the information to improve upon or completely change its processes

### ***Forms of Benchmarking***

Benchmarking can take several forms, some of which are as follows;

- Internal benchmarking studies the practices and performance within the organization itself.
- External benchmarking determines the performance of others, preferably world class companies.
- Quantitative benchmarking allows organizations to measure progress toward goals and to set improvement objectives in terms of specific performance measures or metrics. An example of a metric benchmark might be "cycle time is less than 25 hours" or "order fulfillment is less than 14 days." These metrics are very precise and based on detailed and careful analysis gleaned from surveys or interviews.
- Process benchmarking examines how top performing companies accomplish a specific process. These studies are undertaken through research, surveys, interviews, and site visits. Process benchmarking studies often look at organizations that have recently and successfully implemented reengineering or improvement efforts.

It is important when benchmarking with these stellar organizations that you gain a clear understanding of the scope of their project, the methodology they used, the critical success factors they were able to identify, the challenges and opportunities they faced in implementation and, finally, the important lessons they learned.

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