Unit 34: Operations Management

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Learning Outcome 2

- LO3 **Understand how to organise a typical production process**
  - Ac 3.1 Assess how linear programming adds value to a given production process
  - AC 3.2 Evaluate critical path analysis and network planning
  - AC 3.3 Justify the need for operational planning and control in a selected production process

In this Session

- LO3 **Understand how to organise a typical production process:**
- AC 3.2 3.3 Justify the need for operational planning and control in a selected production process
  - Operational planning and control:
    - activities involved in capacity planning;
    - inventory planning;
    - project management and quality assurance/control
- Further readings
- References

The Nature of Planning and Control

- According to oxbridgenotes.co.uk (2016) planning and control is concerned with the reconciliation between what the market requires and what the operations resources can deliver
- Planning and control activities provide the systems, procedures and decisions which bring different aspects of supply and demands together.
- The purpose is to make a connection between supply and demand that will ensure the operations processes run effectively and efficiently and produce products and services as required by customers.

Capacity Planning for Manufacturing and Service Systems

- Capacity is the ability of a systems potential for producing goods or delivering services over a specific time interval.
- The capacity decisions within a company are very important because they help determine the limit of output and provide a major insight to determining operating costs.
- Basic decisions about capacity often have long term consequences.
- When considering capacity planning within a company, three key inputs should be considered.
  - The kind of capacity to be determined,
  - How much of the products will be needed, and
  - When will the product be needed.

What is Capacity

- Capacity refers to a system's potential for producing goods or delivering services over a specified time interval.
- Capacity can be broken down in two categories:
  1. Design Capacity - refers to the maximum designed service capacity or output rate
  2. Effective Capacity: Effective capacity is design capacity minus personal and other allowances. Product and service factors effect capacity tremendously.

What is Capacity Planning

- Capacity planning takes into consideration future growth and expansion plans, market trends, sales forecasting, etc. Capacity planning involves long-term and short term considerations.
  - Long-term considerations relate to the overall level of capacity;
  - short-term considerations relate to variations in capacity requirements due to seasonal, random, and irregular fluctuations in demand

Short-term Capacity Strategies

- **Inventories**: stock finished goods during slack periods to meet the demand during peak period.
- **Backlog:** some customers are requested to wait and their orders are fulfilled after a peak demand period
- **Employment level (hiring or firing):** in peak demand or decrease demand.
- **Employee training:** train and rotate employees
- **Subcontracting:** when necessary hire other firms
- **Process design**: Change job contents by redesigning the job.

Long-term Capacity Strategies

- **Multiple products:** more than one products are produced using the same facilities in order to increase the profit.
- **Phasing in capacity:** In industries where technology developments are very fast, the rate of obsolescence is high. Products should be brought into the market quickly.
- **Phasing out capacity:** The outdated manufacturing facilities cause excessive plant closures and down time.

Excess Capacity

- Excess capacity arises when actual production is less than what is achievable or optimal for a firm.
- This often means that the demand in the market for the product is below what the firm could potentially supply to the market.
- Excess capacity is inefficient and will cause manufacturers to incur extra costs or lose market share.

Activities involved in Capacity Planning

- The overall objective of strategic capacity planning is to reach an optimal level where production capabilities meet demand.
- Capacity needs include equipment, space, and employee skills.
- If production capabilities are not meeting demand, high costs, strains on resources, and customer loss may result.
- It is important to note that capacity planning has many long term concerns given the long term commitment of resources.

Capacity Decisions - Strategies

- Common strategies include:
  - **Leading capacity**, where capacity is increased to meet expected demand, and
  - **Following capacity**, where companies wait for demand increases before expanding capabilities.
  - **Tracking capacity** which adds incremental capacity over time to meet demand.

Functions of Capacity Planning

- In planning the design capacity (the maximum designed service capacity or output rate) and effective capacity (the design capacity minus personal and other allowances) these two functions of capacity can be used to find the efficiency and utilization.

- These are calculated by the formulas below:
  - Efficiency = Actual Output/ Effective Capacity x 100%
  - Utilization = Actual Output/ Design Capacity x 100%

Inventory Planning

- In production and manufacturing organizations some of the inventories are raw material, finished goods and spare parts.

- In case of raw material inventory management function, managers must analyze demand and decide when to order and how much to order new inventories.

Types of Inventory

1. Raw materials and purchased parts
2. Work in process (WIP)
3. Finished goods inventories or merchandise
4. Maintenance and repairs (MRO) inventory
5. Goods-in-transit to warehouses or customers (pipeline inventory)

Inventory Planning

- **Inventory is a stock or storage of goods and materials that a business holds for resale or use.**
- Inventories are necessary for a firm to operate efficiently and almost all business transactions involve the delivery of a product or service in exchange for currency.
- Inventory management is a very important part of core operations activities. Most retail businesses and wholesale organizations acquire most of their revenue through the sale of merchandise (inventory).
- In order for business and supply chains to run effectively, and efficiently they must meet all the listed requirements for effective inventory management.
- Some of the main concerns are the level of customer service and the cost of ordering, storing, and carrying inventory. Therefore, in order to be a successful and profitable company, inventory management must be managed wisely.

Functions of Inventories

- **Some of the functions of inventories are to:**
  1. Meet anticipated customer demand (in and out of season)
  2. Protect against stock-outs (hold *safety stocks* to prevent the risk of shortages)
  3. Hedge against price increases (purchase large order to hedge future price increase or implement volume discount)
  4. Permit operations (Little's Law: the average amount of inventory in a system is equal to the product of the average demand rate and the average time a unit is in the system)
  5. Take advantage of quantity discounts (supplies may give discount on large orders)
- **For company's management, the most important reasons for having an inventory management system is to:**
  - track existing inventory
  - know what quantity will be needed
  - know when these items will be needed
  - know how much items will cost

Inventory Control

- **There are two types of inventory control used- Perpetual and Periodic.**

1. Perpetual inventory system (usually used in supermarkets or department stores), a continuous flow of inventory count is tracked using a point of sale (POS) check out system. This system is perfect for companies to manage what is sold and reorder when a reorder point is reached. Another advantage of this system is its ability to account for shrinkage (theft) and inventory turnover.

2. The periodic system (used in smaller retailers) is used to take a physical count of inventory at periodic intervals to replenish the inventory. This system would be most beneficial for companies that do not have products with UPC or bar codes, such as nuts and bolts and are purchased in large quantities at a time. In this case, someone on a line would monitor the level of the bin and notify a manager when an order would need to be placed.

Traditional Inventory Management

- **EOQ:** Economic Order Quantity method determines the optimal order quantity that will minimize the total inventory cost. EOQ is a basic model and further models developed based on this model include production Quantity Model and Quantity Discount Model.
- **Continuous Order Model:** works on fixed order quantity basis where a trigger for fixed quantity replenishment is released whenever the inventory level reaches predetermined safety level and triggers re ordering.
- **Periodic System Model:** This model works on the basis of placing order after a fixed period of time.

Further Reading

- https://www.oxbridgenotes.co.uk/revision_notes/management-university-of-exeter-operations-management/samples/operations-management-the-nature-of-planning-and-control-1
- https://catalogue.pearsoned.co.uk/assets/hip/gb/hip_gb_pearsonhighered/samplechapter/0273756192.pdf
- http://www.slideshare.net/WelingkarDLP/product-operation-planning-control

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- oxbridgenotes.co.uk (2016) Operations Management – The Nature of Planning and Control (1) Notes retrieved from https://www.oxbridgenotes.co.uk/revision_notes/management-university-of-exeter-operations-management/samples/operations-management-the-nature-of-planning-and-control-1
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