OVERVIEW OF OPERATIONS MANAGEMENT

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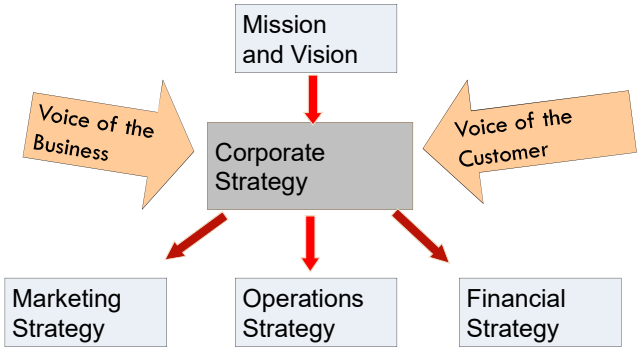
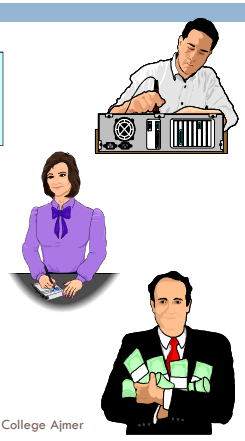
Functions of an organization



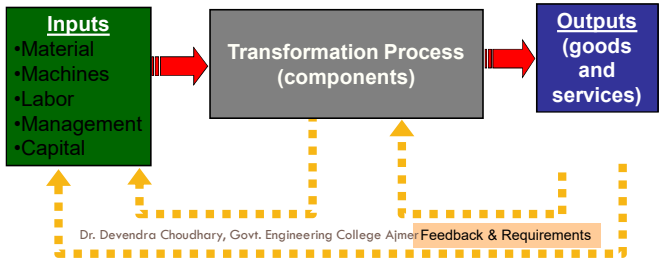
Functions of an organization

- **Operations.**
  - Creates product or service.
- Marketing.
  - Generates demand.
- **Finance/Accounting.**
  - Obtains funds & tracks money.



Production/Operations system

- A production/Operations system takes inputs and converts them into outputs.
- This conversion process is called production or operations.



Few examples of conversion process

Input–Transformation–Output Relationships for Typical Systems

System	Inputs	Components	Primary Transformation Function(s)	Typical Desired Output
Hospital	Patients, medical supplies	MDs, nurses, equipment	Health care (physiological)	Healthy individuals
Restaurant	Hungry customers, food	Chef, waitress, environment	Well-prepared food, well served; agreeable environment (physical and exchange)	Satisfied customers
Automobile factory	Sheet steel, engine parts	Tools, equipment, workers	Fabrication and assembly of cars (physical)	High-quality cars
College or university	High school graduates, books	Teachers, classrooms	Imparting knowledge and skills (informational)	Educated individuals
Department store	Shoppers, stock of goods	Displays, salesclerks	Attract shoppers, promote products, fill orders (exchange)	Sales to satisfied customers
Distribution center	Stockkeeping units (SKU)	Storage bins, stockpickers	Storage and redistribution	Fast delivery, availability of SKUs

Few examples of conversion process

- Physical: manufacturing
- Locational: transportation
- Exchange: retailing
- Storage: warehousing
- Physiological: health care
- Informational: telecommunications

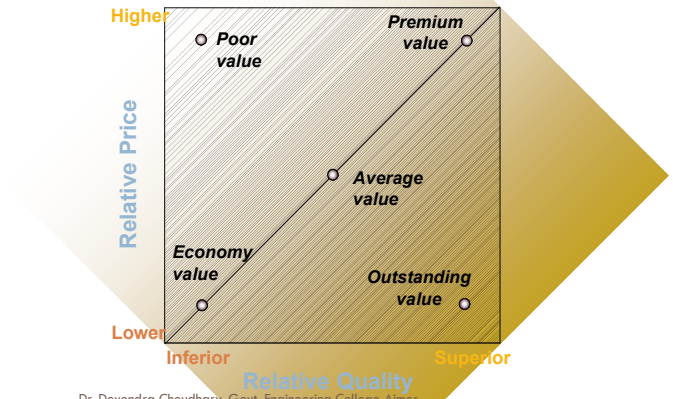
Definition of Operations Management

- Management of the conversion process which transforms inputs such as raw material and labor into outputs in the form of finished goods and services.
- **The planning, designing, scheduling, operating and control of the activities that transform inputs into finished goods and services**
- The ***business function*** responsible for **planning, coordinating,** and **controlling** the resources needed to produce a company's products and services

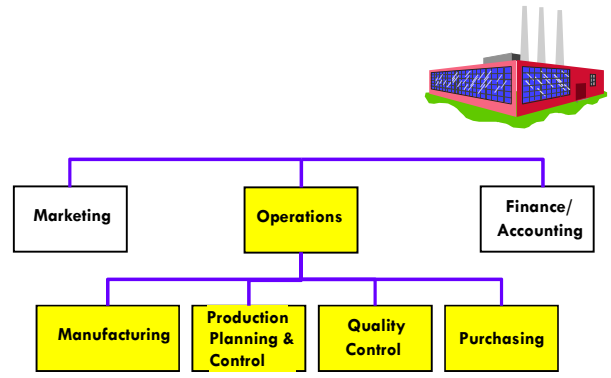
Value

- Defined as quality divided by price.
- The attractiveness of the product (features and durability) relative to its price.
- Four ways to improve value.
- OM's function focuses on adding value through the transformation process of converting inputs into outputs.
- Value added activities and non-value added activities.

Value



Scope of Operations Management



Scope of Operations Management

- Product & service design.
- Process design.
- Capacity & location of facilities.
- Layout of facilities.
- Human resources & Job design.
- Supply-chain management.
- Inventory management.
- Scheduling.
- Quality management.
- Maintenance.

Historical evolution of OM

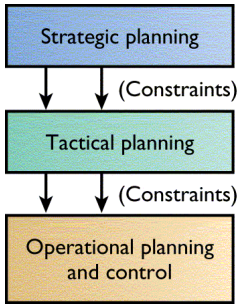
- Craft production
  - process of handcrafting products or services for individual customers
- Division of labor
  - dividing a job into a series of small tasks each performed by a different worker
- Interchangeable parts
  - standardization of parts initially as replacement parts; enabled mass production

Historical evolution of OM

- Scientific management
  - systematic analysis of work methods
- Mass production
  - high-volume production of a standardized product for a mass market
- Lean production
  - adaptation of mass production that prizes quality and flexibility

Decisions

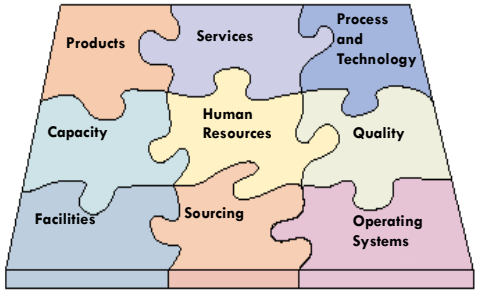
- Operations Strategy Decisions
  - Strategic (long-range)
    - Needs of customers (capacity planning)
  - Tactical (medium-range)
    - Efficient scheduling of resources
  - Operational planning and control (short-range)
    - Immediate tasks and activities



Strategy

Operations strategy

Operational strategies refers to the methods companies use to reach their objectives.



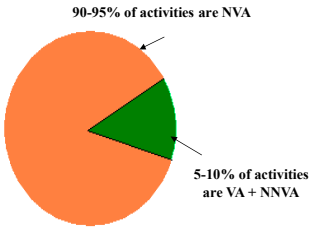
Operations strategy

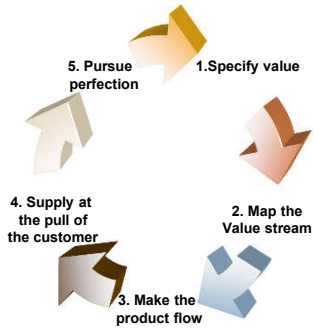
- Lean operations strategy
- Agile operations strategy

Lean operations strategy

Waste (muda) : Any activity which absorbs resources but creates no value.

Types of activities:
1. Non-value adding (NVA)
2. Necessary but non-value adding (NNVA)
3. Value-adding (VA)





Waste elimination is the aim of lean manufacturing

Lean operations strategy

- Main objective is to eliminate waste.
- Reduction of process variability (Six Sigma) is the main facilitator.
- Prioritizes minimization of use of resources through reducing variability and minimizing buffers.
- A process becomes more productive as its material and information flows increase in speed and evenness.

Agile operations strategy

- Main objective is to develop responsiveness.
- Developing operating flexibility (such as product customization, rapid product changeovers and efficient product scaling) is the main facilitator.
- Agility is the ability of the operating system to rapidly reconfigure in accordance with demand volatility (product and quantity).
- It requires buffering in terms of capacity or inventory.

Production policies

- Manufacturing companies use different production policies to satisfy customers' demands.
- The most applicable production policies are
  - Make-To-Stock (MTS),
  - Make-To-Order (MTO),
  - Assemble-To-Order (ATO) and
  - Engineer-To-Order (ETO).
- Each policy has some specific advantages and disadvantages.

Production policies

- The customer order decoupling point or order penetration point is the point where product specifications typically get frozen.

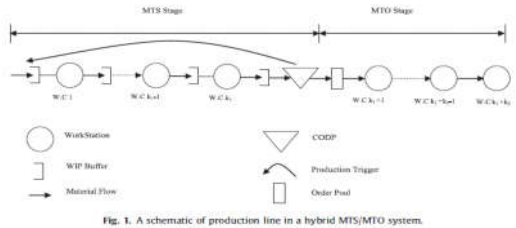
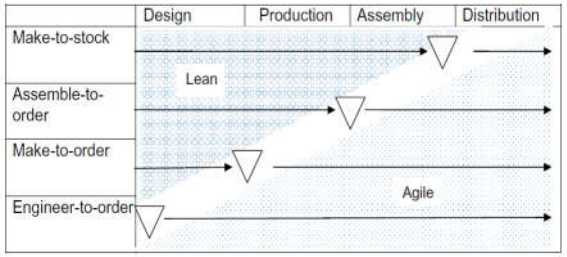


Fig. 1. A schematic of production line in a hybrid MTS/MTO system.

Production policies

- The inventory at the decoupling point is a strategic stock-point that determines lead times and capacity availability for delivery.
- Companies can hold inventory in this point and only complete the final assembly or configuration when the precise customer requirement is known.
- The order penetration point divides the material flow that is forecast-driven (upstream) from the flow that is customer order driven (downstream).
- The concept of postponement, delaying certain SC activities until orders are received, allows companies to use lean methods up to the decoupling point and agile methods beyond it and create a responsive and cost-efficient SC

Production policies



Production policies

- In MTS companies, the customers' demands are satisfied with stocked inventories of finished products.
- The dominant features of such systems are
  - short delivery time,
  - heavy storage cost and
  - low flexibility in responding to customized needs of customers.

Production policies

- On the other hand, MTO companies produce their products based on the customers' orders.
- Main features of MTO systems are
  - long delivery time,
  - low storage cost and
  - higher flexibility in responding to customers' demands

Production policies

Level of uncertainty	Engineering to order	Make-to-order	Assembly-to-order	Make-to-stock
Demand	Highly uncertain	Highly uncertain	Highly uncertain	Stable demand
Supply	Highly Uncertain	Low supply uncertainty, short lead time	Highly uncertain supply lead time	Stable supply
Process	Moderately uncertain	Highly uncertain cycle time, yield, availability	Moderately uncertain: High variability in processing time	Stable process

Production policies

	Engineering to order	Make-toorder	Assembly-toorder	Make-tostock
Delivery time	Highest			Lowest
Storage cost	Minimum			Maximum
Customization	Highest level			Lowest level

Competitiveness and Productivity

- What do customers want?
  - A **lower price** to a higher price.
  - **High quality** over low quality.
  - **Fast service** over slow service.
    - Also good after sale support.
  - **Many features** over few features.
  - **Products tailored** to their specific needs.

Competitiveness

- Cost
- Quality
- Delivery time
- Mass customization
- Flexibility
- Responsiveness

Mass Customization

- It is a production strategy.
- It aims to produce individualized, highly variant products and services with nearly mass production costs.
- It focuses on providing personalized products and services mostly through modularized product/service design, flexible processes and integration between supply chain members.

Mass Customization

- Customer:
  - Three extrinsic value drivers: utilitarian, individualism and self-expression.
  - Two intrinsic value drivers: hedonic and pride
- Producer:
  - Premium prices for customized products.
  - 'Economies of integration' given by postponement of differentiation activities.

Mass Customization

- Mass customization level increases as the order penetration point moves upstream the supply chain.
- Producers allowing greater customer involvement in design and production incur higher manufacturing cost and worst delivery performance.
- Increasing parts variety to respond to customization demands increases the levels of inventories needed to avoid stockout.

Flexibility

- Ability to adjust to changes in product mix, production volume, or design.
- Product Flexibility-speed with which products are created, ability to customize, ability to modify products for special needs
- Volume Flexibility-ability to respond to sudden changes in demand, change from small to full scale
- Process Flexibility-ability to manufacture a variety of goods in a short time, adjust to product mix over time, ability to accommodate changes in raw materials

Responsiveness

- The ability to quickly and efficiently respond to changes in demands for product volumes, product configurations and product generations.

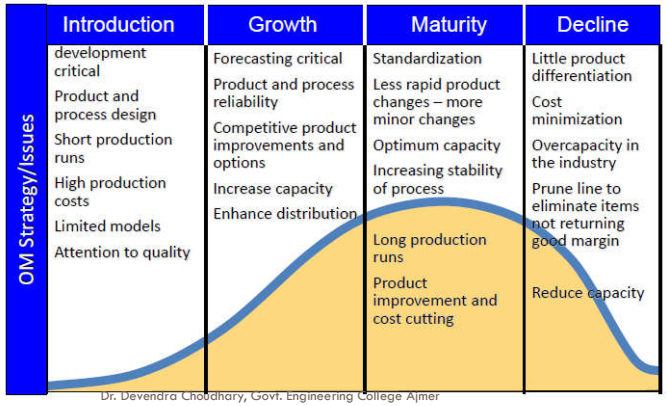
Productivity

- Efficiency:
- Doing things right
- Doing something at the lowest possible cost
- Effectiveness:
- Doing right things
- Doing the things that will create the most value for the customer
- It is degree of attainment of a goal.

Productivity

- A measure of how well resources are used to produce output
- Productivity is ratio of output to input
- The aim in productivity improvement is to increase the 'output/input' ratio.
- Here 'output' stands for the end product, and 'input' includes man-hours, materials, plant, equipment, land, energy and knowledge.
- It is efficiency of use of inputs and effectiveness of outputs.

Product life cycle



Developing an Operations Strategy

1. Segment the market according to the product group.
   Example: need based segmentation
2. Identify (a) product requirements, (b) demand patterns,
   Example: seasonal, low demand
3. Determine the order winners and order qualifiers.
   Example: delivery speed (winner), cost (qualifier)
4. Convert order winners into specific performance requirements. *Example: Must sell at or below 1000 DKK*

Developing an Operations Strategy

The next step is to analyze at the process level…

1. Define the complexity and volume of your product/service.
2. Define whether you offer few specific products/services or highly customized products/services.
3. Finalize product design, process design, supply chain design, supplier relations, capacity management plan & technology choice

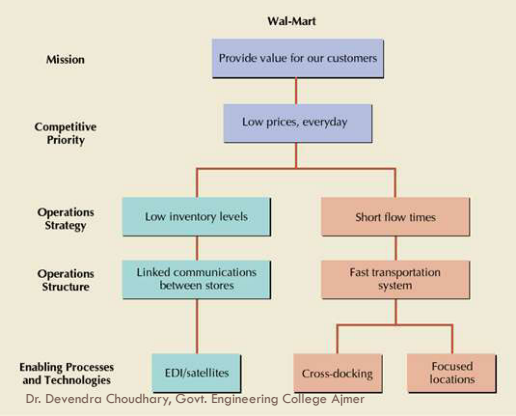
Developing an operations strategy

- What products can be produced in which facility and how much?
- Which products are going to be produced internally, and which ones will be purchased?
- How many facilities are needed?
- Where will the facilities be located, with how much capacity?
- What type of processes will be utilized to produce products?
- How much flexibility is required from each process and each product?

Developing an operations strategy

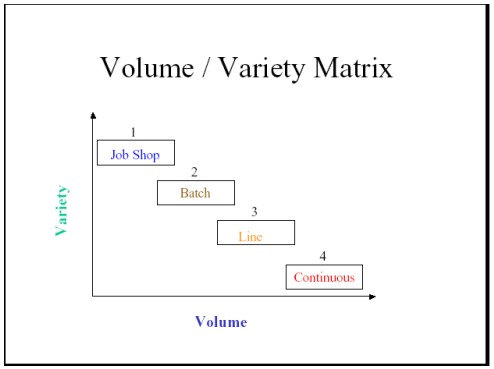
- What level of technology (automation, etc.) will be used?
- Are the resources going to be owned or bought?
- How will the products be distributed to the end customers?
- Which suppliers will provide materials, and how much?
- What kind of human skills are needed?
- And so on.

Operations strategy of Wal-Mart



Developing an operations strategy

Product variety and volume



Productivity improvement

- Four ways to improve productivity
- Partial productivity
- Multifactor productivity
- Total productivity
- Productivity improvement can be achieved by increasing the output, reducing the input or permitting changes in both such that the rate of increase in output is greater than that for input.

Productivity improvement

- Removing or reducing bottlenecks
- Removing or reducing variability
- Improving quality
- Removing work that does not add value
- Applying scientific methods (worker task redesign)