

**Operations Management:** Management of the transformation process (input to output) in an effective and efficient way

### **Company Focus on Supply Chain Management (SCM)**

- flow of Products/services
- Information flow
- Monetary flow

### **Transformation process:**

- Transformed resources (Raw Materials, Information, Customers)
- Transforming resources (Facilities, Machines, Staff)

**Doorlooptijd efficiency:** totale bewerkingstijd/totale doorlooptijd

### **Production & Operations Management:**

- Operations Design (Network-, Product- en Processdesign)
- Operations Planning & Control
  - Capacityplanning
  - Inventoryplanning
  - Productionplanning
    - Just In Time management (JIT)
    - Materials Requirements Planning (MRP)
    - Optimized Production Technology (OPT)
- Operations Improvement
  - Total Quality Management (TQM)
  - Business Process Redesign/Re-engineering (BPR)

### **Why is POM important:**

- Every company has an operations function (Porter: Value Chain)
- A substantial part of the assets of the company are in Operations and Most people working for the company are in Operations
- Operations can be one of the sources for achieving competitive advantage

### **Integrated Strategies and Philosophies**

- Time Based Competition (TBC)
- Just In Time Management (JIT)
- Total Quality Management (TQM)
- Supply Chain Management (SCM)

### **Time Based Competition**

Strategy of seeking competitive advantage by "quicken" the critical organizational processes through eliminating non-essential steps in order to

- attract customers (ease for customers; extended markets; latest technology)
- being the first on the market (premium price; locks distribution channels; allocating market share)
- allow pull production (moving Order Penetration Point OPP; Customization, flexibility; reduction of uncertainty)
- reduce inventories (cost savings; quality improvements; higher dependability-decreased planning complexity)

through shortening

- Time-to-market (total time the firm takes to introduce a new product or to revise an existing product)
  - Integrate all parties involved (cross functional teams)
  - Concurrent engineering
  - Co-operation between parties in the supply chain (better communication; early supplier/customer involvement)
  - Efficient technologies like CAD/CAM
- Time-to-product (The time that the firm takes to respond to a customer-order for an existing product)
  - Wipe out approval (cut away layers of management)
  - Integrated decision making (increase communication; multifunctional teams)
  - Modular production
  - Computer Aided manufacturing (reducing setup time)
  - Cellular manufacturing
- Total Lead Time (Design ; Order handling ; Sourcing ; Manufacturing ; Distribution)

**Just In Time manufacturing => remove waste / improve operations in all aspects**

- Variety
- Quality
- Timeliness
- At a reasonable price

Reduction of

- Excess (excess inventory)
- Waste (defective products)
- Unevenness (sudden jumps in production level)

**Keypoints in JIT-manufacturing**

- Balanced production
  - Leveled scheduling (Heijunka) (kleinere series)
  - Setup Time Reduction SUR ( $EOQ=Q_{opt}=\sqrt{2DCo/Ch}$ ); Demand; Cost of an order; Cost of holding)
- Pull production ; produce when there is a demand (Kanban)
- Visual control ; problem detection immediately after occurrence (Jidoka)
- Employee involvement (involvement; empowerment; responsibility; problem solving capabilities)
- Total Quality management (zero defects; internal customer; focus on quality)
- Ongoing improvement (Kaizen)
- JIT-purchasing (Co-makership) (long term relation; reduction of supplier base; frequent deliveries of low volumes)

**JIT**

- Disadvantages
  - Vulnerable (no safety stocks)
  - Nervous (stressful)
- Obstacles
  - Commitment
  - Willingness of employees
  - Resistance suppliers

**Production methods**

- Push (anticipate with MRP, OPT)
  - Operations driven
  - Efficient usage of resources (keep resources busy; optimal production plan; optimal routing)
- Pull/Po-active (reaction with JIT)
  - Demand driven (only produce when there is demand)

**Optimized Production Technology**

- Software package
- Theory of constraints (TOC)

**Strategy Hierarchy**

- Corporate strategy
  - What business to be in (acquire?/divest?)
  - Allocation of cash?
- Business strategy
  - What are the Strategic objectives?
  - How to compete?
- Functional Strategy
  - How to contribute to strategic objectives
  - How to manage the resources

**Strategy:** from "Where are we ?" (SWOT) to "Where we want to be ?" (Mission)

(Strategie is richting geven)

**Strategy is needed to:**

- Create a consistent pattern in decisions
- To set priorities for the Key Performance Measures (to show where to put your money/efforts)

## Production & Operations Management

The choice of Operations strategy is dependent on Customers ; Competition; Product/service ; Capabilities

Operations Strategy guides all decisions in Design ; Utilization ; Improvement

**Key Performance Measures (Critical success Factors CSF's) with their Key Performance Indicators (KPI's)**

- Cost
  - Utilization
  - Productivity
  - Inventory turns
- Quality products/services/innovation (TQM)
  - % defective produced
  - # of complaints
- Speed (TBC)
  - Order lead time
  - Time-to-market of new product
- Dependability (JIT;Quick Response;Efficiënt Consumer REsponse)
  - Fill rate (leverbetrouwbaarheid)
  - Lost Sales
  - % deliveries in time
- Flexibility (change-ability of production)
  - Change-over times
  - # Stock Keeping Units (SKU's)
  - Span of volume

**APS:** Application Planning Software

T-Ford: standaardisatie en kostenreductie ; probleem: voorraadkosten door hoge productie, klantwensen mbt product

Verandering van product naar dienst (Albert Heijn financier van mass customisation)

**KOOP** klanten order ontkoppel punt (Hoe ver dringt een klantenorder door ?)

- Vóór het KOOP => anonieme productie
- Na het KOOP => klantenorder gedreven productie

	Proces vóór het KOOP		Proces na het KOOP
<b>Product</b>	Standaardisatie	<b>KOOP voorraadpunt</b>	Optiemogelijkheden
<b>Productie</b>	Hoog volume /massa		Flexibiliteit/korte insteltijd/serie=1
<b>Mensen</b>	Specialist		Generalist
<b>Beheersing</b>	Voorspelling		Orders
<b>Risico</b>	Onverkoopbaar		Doorlooptijd/capaciteit
<b>Productiviteit</b>	Efficiëncy		Effectiviteit
<b>Leidinggeven</b>	Hierarchisch		Creatief

**Order qualifier:** Criteria which make customers **consider** the product/service (must be at least as good as competition)

**Order winner:** Criteria which make customers **buy** the product/service (must be better than competition)

**Impact of Product Life Cycle**

	Introduction	Growth	Maturity	Decline
<b>Variety of product/service</b>	High customization	Increasingly standardized	Dominant types	Commodity
<b>Likely Order Winner</b>	Performance Novelty	Availability	Low price/Dependable supply	Low price
<b>Likely Order Qualifier</b>	Quality	Price/.Product range	Product range, quality	Dependable supply

**Value Matrix**

	Invariable	Variable
<b>Tangible</b>	What it does (specs)	How it gets to you (right time,place)
<b>Intangible</b>	What it identifies with (brand image)	How it is transferred (Sales-effort, Ease)

**Throughput efficiency (processing time/throughput)**

- Processing time
- Setup time
- Queue time
- Wait time
- idle time

**Throughput efficiency = Processing time / Throughput time**

- Flow shop (high)
- Job Shop (lower)
- Service organizations (low)

**Choices of Production Process**

	<u>variety</u>	<u>Volume</u>
• Project	high	Low
• Job-shop		
• Batch		
• Mass		
• Continuous	low	high

**Level of Customization (Order Penetration Point)**

- Make-to-stock      Make-to-order      Assemble-to-order

**Business Process Re-engineering** (Radical redesign of business processes for dramatic improvement)

- Improved customer focus (Quality)
- Speed / dependability (cycle time reduction;throughput time forecastability)
- Flexibility (people are able to do more than their specialist job)
- Productivity increase (cost reduction)

**Trend:** Mass production (1920) => Mass Customization (1970) => Mass Individualization (2000)

**Location factors**

- Cost
- Regulations and incentives
- Infrastructure
- Competition
- International considerations (currency rates;political stability;availability of resources)

**parametrisch ontwerpen** (variabele maten)

**Facility location:**

- source bound activities close to supply of materials (Decentralized)
- market bound activities close to demand (Decentralized)
- Footloose activities can take place anywhere (centralized)

**Centre of Gravity-model (determine the optimal location of the manufacturing plant)**

**Keypoints to Operations Design**

- Choice of products, process, location, layout
- strategic nature
- OD has to be in line with the Operations strategy
- Production Processes characterized by Variety-Volume and OPP
- Drivers for Centralization (economies of scale) or decentralization (response time, transportation costs)

**Production Planning:**

- Capacity planning (1-5 years)
  - maximum amount of resources available in a given time period
  - maximum output rate of an operation
- Aggregate Planning (6-12 months)
- Master production schedule(MPS)/ Materials Requirements planning (MRP) (3-10 days)
- Sequencing/Scheduling (1-8 hours)

**Aggregate planning strategies**

- Level capacity strategy (same level of capacity throughout the year;inventory meets variations)
  - provide (eerste hulp, hotel) + speed - high cost
  - Level (seasonal products) + planning,cost -service in peak periods
- Chase demand strategy (capacity meets changing demand; no inventories; overtime and subcontracting) + customersatisfaction - planning
- Mixed demand strategy

**Hockey Stick Phenomenon:** Peaks of Volume in time (solution is Demand Management)

**Demand Management:** Airlines, hotels

- Costs determined by inflexible capacity
- Revenue depends fully on demand
- inventory can not be used to smooth out demand

**Strategies of Demand Management**

- Over-booking
- Pricing (night-time electricity)
- Anti-cyclic promotions

**Levels of Quality Management**

- Quality Inspection
- Quality Control (Statistical Process Control; SPC= seek sources of non-natural variation)
- Quality Assurance (ISO-9000)
  - Benefits
    - Competitive advantage
    - Competitive necessity
    - Better Operations System
    - Clear implementation plans are available
  - Remarks
    - Used for wrong reasons (marketing, forced by customers)
    - no guarantee for good products/services
    - Bureaucracy
    - Not customer focused (internally focused)
- Total Quality Management (entire organization)
  - Customer (internal/external)
  - Empowerment
    - Employee responsibility and commitment
    - Everybody has the power to make decisions
    - Teamwork (joint decision making)
    - Bottom-up suggestions for improvement
  - Quality at source
    - Prevention (quality control at each process)
    - Quality control by process-owner
    - Supplier-customer Partnership
  - On Going Improvement (Kaizen)
    - as a Target (zero-defects)
    - continuously
    - incremental improvement
    - Deming wheel (Plan, Do, Check, Act)
  - Management based on facts
    - Measure performance
    - Implementation through EFQM or INK-models

**Statistical Process Control**

- does **not** give the reason **why** the process is out of control
- to find assignable causes use
  - Cause-effect diagrams (visgraad diagrammen) (nadeel: geen relatie tussen categorieën)
  - Pareto charts

De badkuip-kromme (U) geeft de kans aan op een fout in de tijd

**Quality of Design** (Accordance to customers wishes)

**Quality of Conformance** (Manufactured according to design)

**Customer Satisfaction** = Experienced Quality - Expected Quality

**Cost of Quality**

- Control Cost (Unavoidable cost)
  - Prevention cost (process/product design; training)
  - Appraisal cost (quality audits; statistical quality control)
- Failure Cost (Avoidable cost)
  - Internal failure cost (yield losses; rework charges)
  - External failure cost (returns / recalls; (warranty) repairs)