Modern Logistics & Supply Chain Management

ML & SCM

Supply Chain Management

"Management by objectives works if you first think through your objectives. Ninety percent of the time you haven't."
Peter Drucker

Dr. Wolfgang Garn
Winter 2016

Learning Objectives

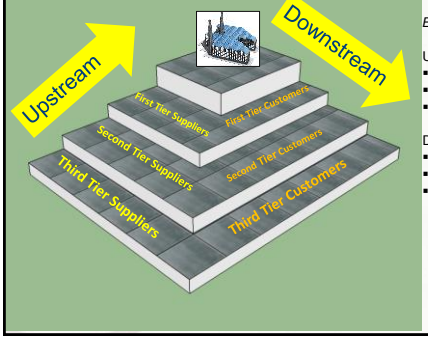
- Define Supply Chain and Supply Chain Management
- Understand the Bullwhip Effect
- Explain the processes involved in Supply Chain Management
- Describe collaboration and integration of suppliers
- Describe Logistics in Supply Chain Management

Overview

Supply Chain Structure
Forrester Effect
Procurement
Sales & Distribution
Supplier Collaboration & Integration
Logistics

The Organisation

Suppliers and Customers

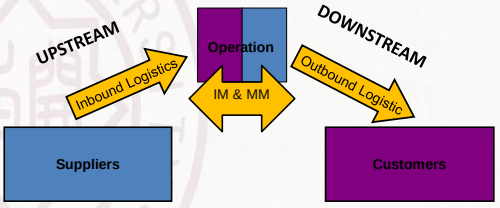


Examples

Upstream Tiers
- Material Suppliers
- Component S.
- Sub-Assembly S.

Downstream Tiers
- Wholesalers
- Retailers
- Consumers

Supply Chain

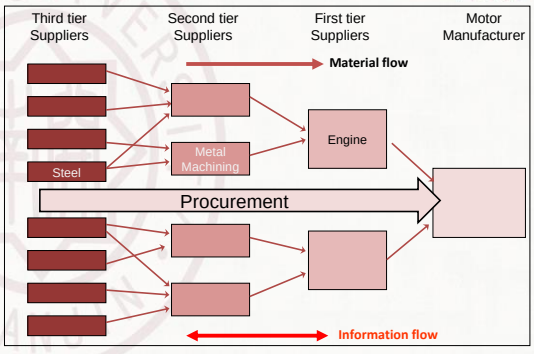


Note: The Operation is both a Customer and a Supplier

Within Organisation

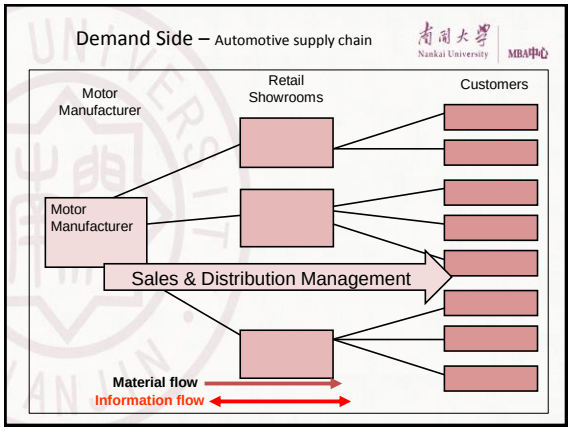
- Materials Management
  - Activity of moving materials within the organisation
- Inventory and Materials Management
  - Next Lecture!
    - MRP, MRPII, ERP, …

Supply Side – Automotive supply chain



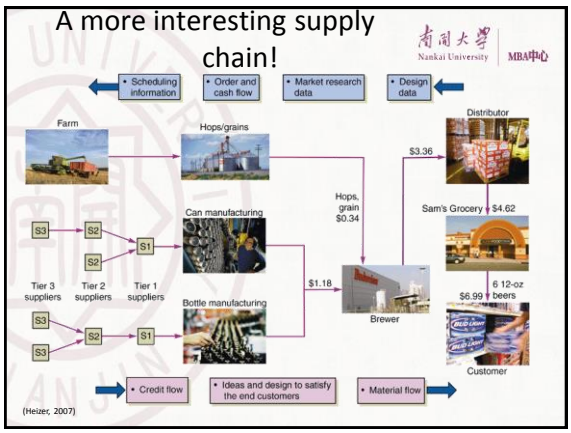
Supply side

- Upstream tiers
  - Suppliers
- Procurement activity
  - Acquiring materials, services required for the Organisation
- Inbound logistics
  - Activity of moving materials in from suppliers



Demand side

- Downstream tiers
  - Customers
- Sales & Distribution Management
  - Sales and movement of materials from the operation to customers
- Outbound Logistics
  - Activity of moving materials out to the customer



Supply Chain

- … is a sequence of activities that moves material from suppliers, through operations to customers (Greasley, 2009).
- … is a sequence of business and information processes that link the procurement of a product or service from its suppliers and the provision through its operations and distribution channels to the ultimate customer (Jones and Robinson, 2010).

Supply Chain Management

- … is the management of the flow of materials through the entire supply chain.
- … plans, designs, organises and controls the flow of information and materials along the supply chain in order to meet customer requirements in an efficient manner.

Learned so far

- Upstream & Downstream Tiers
- Inbound & Outbound Logistics
- Procurement & Sales and Distribution
- Supply Chain & Supply Chain Management

Overview

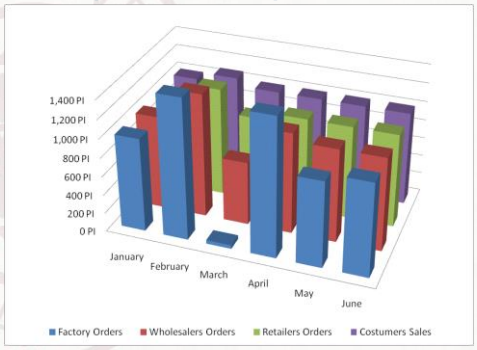
- Supply Chain Structure
- **Forrester Effect**
- Procurement
- Sales & Distribution
- Supplier Collaboration & Integration
- Logistics

Bullwhip Effect – Example

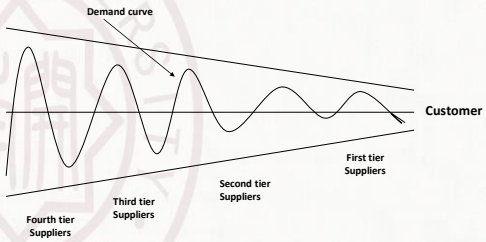
	Example	Month	January	February	March	April	May	June
Operations	Factory	Demand	1,000 Pl	1,320 Pl	680 Pl	1,080 Pl	1,000 Pl	1,000 Pl
		Opening Stock	1,000 Pl	1,000 Pl	1,320 Pl	680 Pl	1,080 Pl	1,000 Pl
		Closing Stock	1,000 Pl	1,320 Pl	680 Pl	1,080 Pl	1,000 Pl	1,000 Pl
		Orders	1,000 Pl	1,640 Pl	40 Pl	1,480 Pl	920 Pl	1,000 Pl
1st Tier	Wholesalers	Demand	1,000 Pl	1,160 Pl	920 Pl	1,000 Pl	1,000 Pl	1,000 Pl
		Opening Stock	1,000 Pl	1,000 Pl	1,160 Pl	920 Pl	1,000 Pl	1,000 Pl
		Closing Stock	1,000 Pl	1,160 Pl	920 Pl	1,000 Pl	1,000 Pl	1,000 Pl
		Orders	1,000 Pl	1,320 Pl	680 Pl	1,080 Pl	1,000 Pl	1,000 Pl
2nd Tier	Retailers	Demand	1,000 Pl	1,080 Pl	1,000 Pl	1,000 Pl	1,000 Pl	1,000 Pl
		Opening Stock	1,000 Pl	1,000 Pl	1,080 Pl	1,000 Pl	1,000 Pl	1,000 Pl
		Closing Stock	1,000 Pl	1,080 Pl	1,000 Pl	1,000 Pl	1,000 Pl	1,000 Pl
		Orders	1,000 Pl	1,160 Pl	920 Pl	1,000 Pl	1,000 Pl	1,000 Pl
3rd Tier	Costumers	Sales	1,000 Pl	1,080 Pl	1,000 Pl	1,000 Pl	1,000 Pl	1,000 Pl

For this example:
Orders = Demand – (Closing Stock – Opening Stock)
Current Demand = Order from preceding tier
Closing Stock = Current Demand
Opening Stock = Demand from previous month

Bullwhip Effect - Example



Bullwhip Effect



Bullwhip Effect

Demonstrating fluctuation of the demand side

- We observe
  - Exponential demand propagation
    - if no cross-business observations and actions take place
  - Much time is lost until production levels have gone back to normal
- Bullwhip Effect was first described by Jay Forrester (1961)
  - That is why this is also known as the **Forrester Effect**

Bullwhip Effect - Motivation

- Why?
  - Cost savings
    - Continuous production with little variation
    - Less inventory costs
  - Efficient Supply Chain
    - Faster response to demand
- How?
  - Integrating (bringing together, letting each other know about) the demand side and supplier side.
  - Disintermediation

Overview

- Supply Chain Structure
- Forrester Effect
- **Procurement**
- Sales & Distribution
- Supplier Collaboration & Integration
- Logistics

Procurement

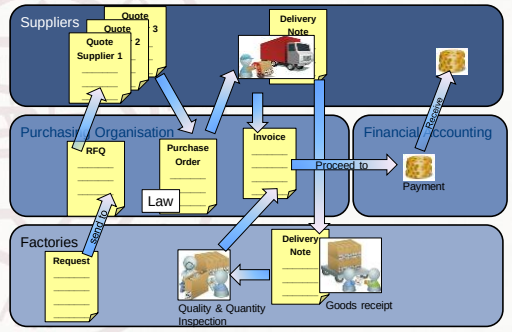
– Acquiring materials, services required for the Organisation
  - Acquisition methods are purchasing, contracts, rentals, etc.

Example: Profit Increase.
A product is sold for £130. £50 are spent on operations and £70 on materials. Thus we have a profit of £130 - £50 - £70 = £10 per unit.
Assume that the purchasing organisation was able to get a 10% discount on the materials (i.e. £70 - £7 = £63).
By what percentage has the profit increased?
Profit = £130 - £50 - £63 = £17 per unit,
Profit increase = New Profit / Old Profit – 1 = £17 / £10 – 1 = 70%

Procurement Process - Selection

- Identify needs
- Decide to make or buy
- Identify type of purchase
- Conduct market analysis
- Identify possible suppliers
- Choose appropriate supplier

Procurement Process



Procurement - Process

- Requirement determination
- Suppliers (RFQ)
- Vendor selection
- Order processing
- Goods receipt
- Monitoring purchase
- Purchase Order
- Invoice verification
- Payment processing

Many requirements across all factories in the enterprise are collected
A central purchasing organisation determines the vendors and oversees the order processing to get discounts and coordinates the goods receipt and distribution to the warehouses
A constant monitoring of the purchase guarantees the execution of the purchase order
Quality inspection in combination with the invoice verification concludes in the payment processing

Procurement Process – Execution

1. Purchase order.
   The documentation that specifies the items required and their volume.
2. Order confirmation.
   An acknowledgement of the order from the suppliers confirming the items are available and will be delivered on time (if specified).
3. Delivery monitoring.
   The buyer may choose to monitor or track where in the supply chain the items have got to. This can be done these days using RFID technology.
4. Delivery notification.
   Confirmation from the supplier as to when the goods will be delivered.

Procurement Process – Execution

5. Delivery reception.
   The process that buyers go through upon receipt of the goods. Depending on the nature of the items, these may be meticulously inspected to ensure they conform to specification, or simply signed off.
6. Returns.
   These are items not accepted by the buyer and returned immediately upon delivery.
7. Payment.
   Systems will be put in place depending on the nature of the supplier/ buyer relationship on the terms of payment, i.e. number of days' credit, penalties for late payment etc.

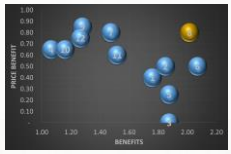
Supplier Evaluation

- This is often based on COST, QUALITY and DELIVERY (although not exclusively)
- Supplier Evaluation will be linked to the Order Winners of the Operation
  - Cost
  - Quality
  - Dependability
  - Flexibility
  - Speed

Systematic Decision Making

	Region	Quality	distance to plant	distance to warehouse	price
1	A	2	60	100	120
2	B	3	40	130	100
3	B	4	100	150	200
4	A	2	400	110	70
5	B	3	50	100	150
6	A	4	50	140	100
7	B	3	200	90	40
8	A	4	100	110	40
9	B	4	100	100	30
10	A	3	300	110	70
11	B	3	330	70	80
12	A	2	300	110	50

- Collect data
- Shortlisting
  - E.g. quality > 2*, distance < 150km, lowest price first
- Equal weight decision strategy
- Weighted decision strategy => utilities
- Benefits versus "price"



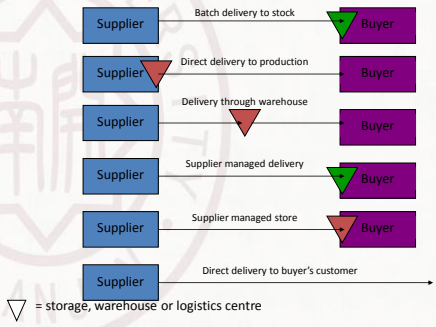
Utility function

See Example:
MLSCM-DecisionMatrix-solution.xlsx

Single & Multi - Sourcing

- Single sourcing
  - cost savings by ordering in larger quantities at one time - economies of scale.
  - maintain confidentiality
  - communication and administrations simpler.
- Multiple sourcing
  - Continuity of supply is paramount.
  - Flexibility in meeting changes in demand
  - Cost savings through price competition.

Different Modes of Supply



Types of Contract

Direct competition. This refers to a buyer deciding who to buy from on each occasion an order is placed. Suppliers compete to win an order on whatever criteria the buyer has stipulated – typically cost but not necessarily exclusively so.

Contracts in direct competition. Instead of competing for single orders, suppliers compete against each for a contract to supply over a specified time period. This may require the buyer to stipulate a minimum order quantity for that period.

Operative contracts. These tend to be based on supplier performance rather than on comparing one supplier against another, as in the former two cases. Contracts are entered into for the medium-term, say 3 to 5 years, and tend to be renewed so long as the supplier has performed well.

Strategic contracts. There are likely to be relatively few of these suppliers but the value of their contracts will be high. There may not even be a termination clause in the contract.

Law

Procurement - Performance & Control

- Performance
  - Continuity of supply
  - Value of stock held
  - Quality of relationship with suppliers
- Control
  - Achievement of target profit performance
  - Low wastage of materials
  - Accurate and timely measurement of operating department performance

Barriers to Successful Supply Chain management

- Lack of ownership – lines of responsibility are not clear
- Chaos risks – mistrust, distorted information
- JIT relationship – knock on effect (Bullwhip)
- Inertia risks – lack of responsiveness

Procurement

- E - Procurement
  - Electronic integration and management of all procurement activities between purchaser and supplier.
- Supplier negotiation
  - Purchasing organisation must demonstrate price consciousness
  - Knowledge of law
  - Contract forms: exclusivity, long-term

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- **Sales & Distribution**
- Supplier Collaboration & Integration
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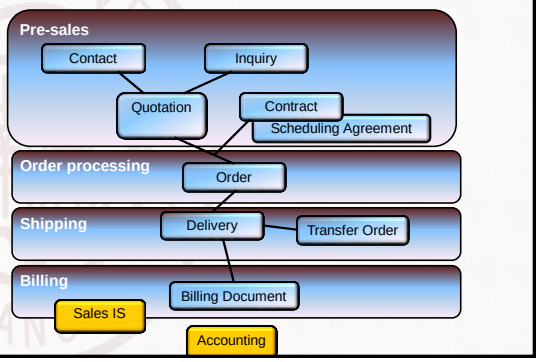
Sales & Distribution Management

- Sales Organisation
  - Distributing goods and services
    - Distribution channels
      - e.g. Internet, Wholesale, Retail
      - Responsibilities, Pricing, Statistics
    - Divisions to group materials and services
      - e.g. Engines, Cars, Services
  - Negotiating sales conditions
  - Product liability (rights of recourse)

Distributing Goods - Physical Distribution Management

- Materials Handling
  - Movement of materials within warehouses, between storage areas and transportation links
- Warehousing
  - Usage of location to hold stock
- Picking and Packing
- Transportation

Order to Cash



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- **Supplier Collaboration & Integration**
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Supplier Collaboration & Integration

- Simple B2B Relationships
- Supplier Partnerships or Alliances
- Virtual Organisations
- Vertical Integration

- Disintermediation & Reintermediation

Supplier Collaboration

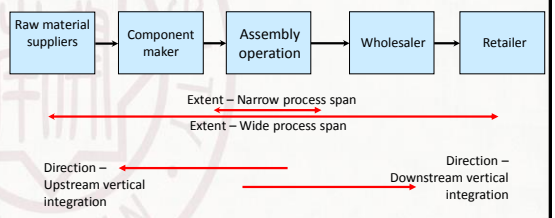
Vertical integration

How much of the supply chain should the organisation own?

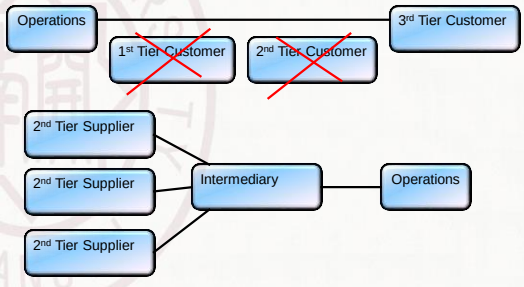
Extent of the process span required
- Narrow process span
- Wide process span

Need to balance capacity requirements across the whole supply chain to generate an even flow

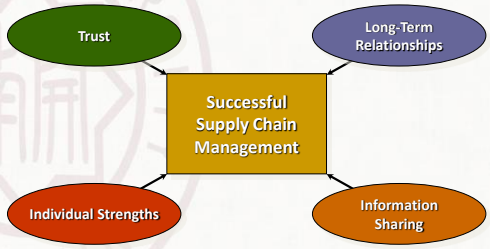
Example of Vertical Integration



Disintermediation and Reintermediation



Drivers of Successful Supply Chain Management



Benefits of Successful Supply Chain management

By successfully managing the supply chain, Operations Managers may achieve:

- A reduction in the total cost of inventory held by the chain as a whole.
- A reduction in administrative overhead involved in managing multiple relationships.
- Higher service levels and quality improvement.
- Faster response to changes in market demand.

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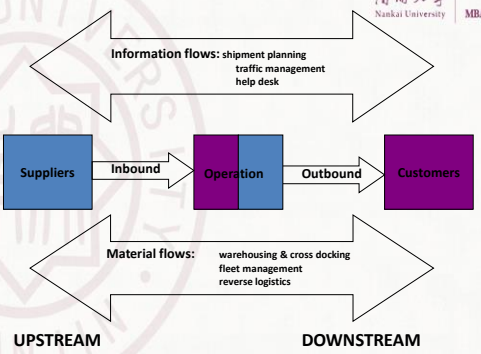
- **Logistics**

Logistics

- Inbound and Outbound Logistics
  - Movement of materials in from suppliers and out to customers
- Transportation means
  - Trucks, Trains, Ships, Planes, Pipelines
    - Containers
- Fleet Management
  - Strategic choice of shipping points
  - Optimal routing of transportation units

Logistics management



Logistics

- Third party logistics (3PL)
  - companies that are specialist providers of warehousing, transportation, financial services and/or distribution services provide their services to organisations as an outsourced resource as part of the overall supply chain.
- Fourth party logistics (4PL)
  - companies have now developed levels of expertise such that they can offer organisations a complete package of services to manage their 3PL's. Originally used and trademarked by Accenture, these companies offer a service to organisations which have outsourced their logistics arrangements to two or more third party logistics companies, by coordinating the whole operation for them. For example one 3PL company might deal with warehousing and transport, whilst another deals with finance and human resources.
- Seventh party logistics (7PL)
  - this is a recent innovation whereby one company does the whole job of all of the outsourced logistics companies (i.e. 3PL + 4 PL = 7PL)!
- Reverse logistics
  - the introduction of returns policies for many products which also helps to reduce the amount of landfill waste disposal and increase recycling opportunities has led to the notion of 'reverse logistics'

Recap

Write down and discuss with the person next to you the three most important things that you want to remember from this lecture.

Time: 2 minutes

Three most important things

1. _____
2. _____
3. _____

Additional reading/tasks

Look at general Supply Chain and Logistics text books and journal papers – as referred to in the "Welcome presentation"