Enterprise Systems & Architecture

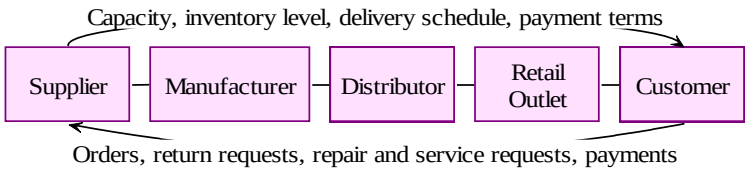
SCM

Port of Shanghai *> 40 million TEUs in 2017*

What is a Supply Chain?

- Supply chain management (SCM)
  - The function of planning, organising and optimising the supply chain's activities.
- It consists of two areas:
  - The *flow of materials, information, money* and services from raw material suppliers, through factories and warehouses, to the end customers
    - Supply chains exist within businesses and between/across businesses
  - A *network of facilities* for procuring materials, transforming raw materials into finished products,' and distributing finished produce to customers.

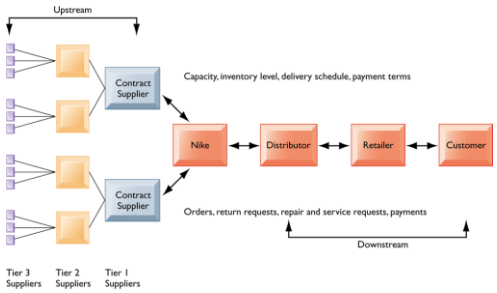
Structure & Components of Supply Chains



- *Material flows*
  - The physical products, raw materials, supplies and so forth that flow along the chain.
  - Reverse flows – returned products, recycled products and disposal of materials or products.
- *Information flows*
  - All data related to demand, shipments, orders, returns and schedules as well as changes in any of these data.
- *Financial flows*
  - all transfers of money, payments and credit-related data.

Structure & Components of Supply Chains

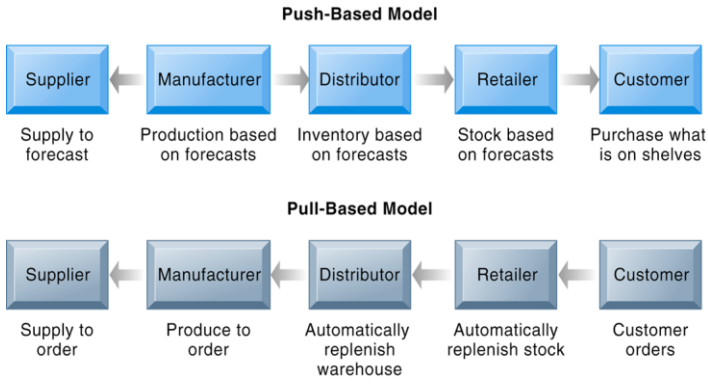
- The network of facilities of a supply chain involves three segments:
  - Upstream facilities; the sourcing or procurement from external suppliers ;
  - Internal, where packaging, assembly or manufacturing takes place;
  - Downstream, where distribution takes place, frequently by external distributors.
- Tiers of suppliers (industrial value chain)
  - Suppliers may have one or more sub-suppliers, and the sub-supplier may have its own sub-supplier(s) and so on.



Supply Chain Management: Objectives

- Criteria of an efficient *supply chain* ensures…
  - The procurement of right products
  - To the right place
  - At the right time
  - In the proper quantity
  - At an acceptable cost
- ***The ultimate goal of any effective supply chain management system is to reduce inventory (with the assumption that products are available when needed)***

Push V Pull based supply chain models



Poor management of supply chains

- **Some Results associated with poor supply chain management**
  - High inventory costs: Excessive product
  - Poor customer service – not delivering products or services when and where the customers need them.
  - Poor quality product: mismatch between requirement and product delivered
  - Poor planning capabilities
  - Increased cost associated with tracking/managing supply chain

Supply chain diversity challenges

- Supply chains involve diversity in organisations and technology:
  - These span from small to very large organisations
  - Introduces diversity of processes and IT systems
- Increasingly supply chains are international or global and this introduces further problems:
  - Cultural differences
  - Language and currency
  - Economic and Political Differences
  - Legal issues (Tariffs, trade restrictions)

Examples of modern supply chain challenges

- Tracking the *farm of origin* of food produce
  - The retail store/consumer may be based in Europe, the manufacturer based in Asia and producer based in Africa or South America
- Processing of *returning products*
  - Products have to be returned through the supply chain to the manufacturing facility
- Heavily seasonal/unpredictable demand
  - E.g. Seasonal demand e.g. Christmas toy demand, weather impacted products (such as fruit), new product launches (latest iPhone etc)

Typical supply Chain failures

- Problems stem mainly from two sources:
  - *Uncertainties* due to: demand forecast, delivery times, quality problems in materials and parts that can create production delays;
  - The need to coordinate several activities, both internal units and business partners (suppliers/retailers).
- Supply chains are often chaotic systems: small changes amplify to become major problems e.g. Nike supply chain
  - An issue in one part of the supply chain will lead to problems further down the supply chain
  - The downstream problems will in turn lead to secondary problems

Supply Chain Management Systems

Supply Chain Management Systems

- Supply chain management (SCM)
  - The function of planning, organising and optimising the supply chain's activities.
- A supply chain management system should:
  - be a cross-functional inter-enterprise system
  - help support and manage the links between a company's key business processes (ERP) and those of its suppliers, customers and business partners (industrial value web)
- Challenges similar to those face in ERP - but across multiple organisations.: e.g. a common database structure…. (refer to lecture on ERP)

Components of SCM

- Plan (strategic level)
- Source (tactical level)
- Make (operational level)
- Deliver (execution level)
- Return (executional level)

Plan

- The strategic portion of SCM.
- Companies need a strategy for managing all the resources that go toward meeting customer demand for their product or service.
- A big piece of SCM planning is developing a ***set of metrics to monitor the supply chain*** so that it is efficient, costs less and delivers high quality and value to customers.

Source

- Companies must ***choose suppliers*** to deliver the goods and services they need to create their product.
- Therefore, supply chain managers must ***develop a set of pricing, delivery and payment processes*** with suppliers and create metrics for monitoring and improving the relationships.
- SCM managers can put together processes for ***managing their goods and services inventory***, including receiving and verifying shipments, transferring them to the manufacturing facilities and authorizing supplier payments.

Make

- The manufacturing step.
- Supply chain managers ***schedule the activities*** necessary for production, testing, packaging and preparation for delivery.
- This is the most ***metric-intensive portion*** of the supply chain—one where companies are able to ***measure quality levels, production output and worker productivity***.

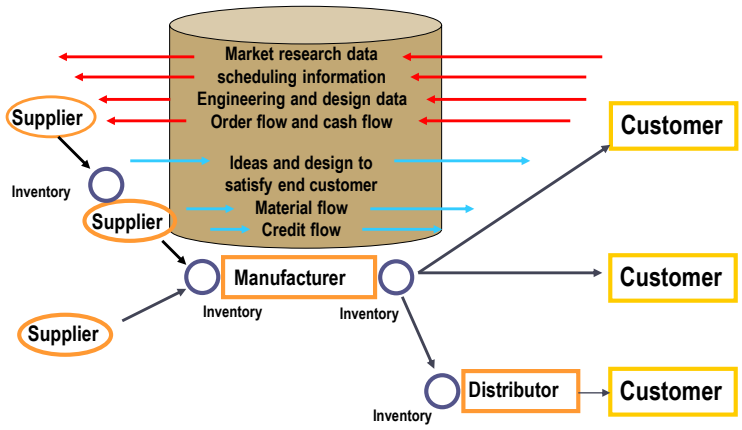
Deliver

- Also may be referred to as logistics
- Companies coordinate the receipt of orders from customers
- Develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.

Return

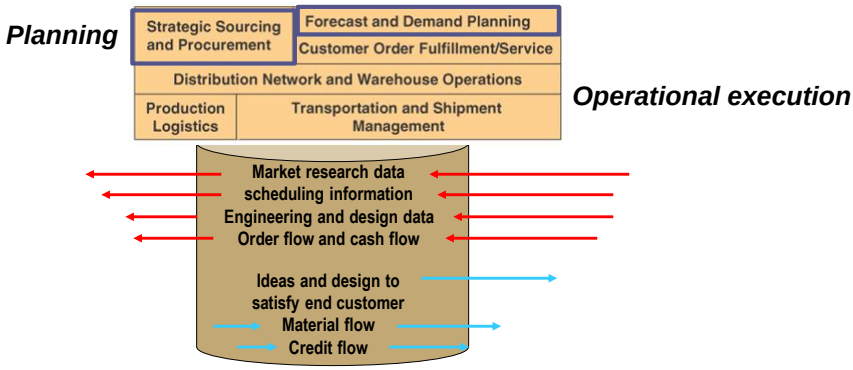
- Supply chain planners have to create a responsive and flexible network for receiving defective and excess products back from their customers and supporting customers who have problems with delivered products..

SCM Architecture: Integration



- SCM systems must support data flows across multiple systems and organisational boundaries
- The data is integrated into a data warehouse and then distributed to other points in the supply chain.

SCM Architecture: Consolidation (supply chain modules)



- Using the data warehouse, the modules functionality supports:
  - operational execution of the supply chain activities via operational execution modules
  - planning of future requirements is implemented via planning modules

Supply chain planning system

- The planning applications include:
  - Demand planning
  - Order planning
  - Advanced scheduling and manufacturing planning
  - Distribution planning
  - Transportation planning

Supply chain execution systems

Manage flow of products through distribution centres and warehouses to ensure products delivered to right locations in most efficient manner

- Order commitments
- Replenishment
- Distribution management
- Reverse distribution

SCM systems business benefits

- **Visibility**
  - Enhanced visibility - trading partners have the info needed for planning (win/win); e.g. toyota and its suppliers
- **Collaboration with Suppliers**
  - When supplies run low,
    replenish message to supplier who sends goods directly to shelves bypassing warehousing costs
- **The payoff**:
  - timely and accurate supply chain information is the ability to make or ship only as much of a product as there is a market for. This is the practice known as ***just-in-time manufacturing***, and it allows companies to reduce the amount of inventory that they keep. This can cut costs substantially, since you no longer need to pay to produce and store excess goods

Business value of supply chain management systems

- Matching supply to demand and reducing inventory levels
- Improving delivery service and speeding product time to market
- Using assets more effectively
- Increasing sales by assuring availability of products
- Increased profitability
  - Supply chain costs can approach 75% of total operating budgets

Blockers to the SCM system: Trust and resistance

- Trust
  - Between trading partners is NOT the norm
  - Fully implemented SCM systems require high degrees of transparency between the supply chain participants
  - Often moves negotiation away from price and towards cost i.e. The buyer has visibility of the sellers' costs and the price is based on an agreed profit margin – not supply/demand dynamics
  - This means SCM systems are often most successful where the supply chain has a dominant participant who can force co-operation from other participants and pay for the system
    - E.g. Tesco, Walmart, large car manufacturers
- Resistance
  - Competition from traditional communication media, hunches, human to human interaction
  - And SCM is similar to ERP in impact on organisation – and face similar issues related to organisational readiness
- Cost of implementing the system
  - Participants need to determine who pays

Proctor & Gamble Products

Wal-Mart and Procter and Gamble

- These two companies started collaborating back in the '80s when retailers shared very little information with manufacturers.
- The two giants built a software system that hooked Proctor & Gamble up to Wal-Mart's distribution centres. When Proctor & Gamble's products run low at the distribution centres, the system sends an automatic alert to Proctor & Gamble to ship more products.
- In some cases, the system goes all the way to individual Wal-Mart stores. It lets Proctor & Gamble monitor the shelves through real-time satellite up-links that send messages to the factory whenever a Proctor & Gamble item swoops past a scanner at the Wal-Mart register.

Wal-Mart and Procter and Gamble

- With this kind of up-to-date information, Proctor & Gamble knows when to make, ship and display more products at the Wal-Mart stores.
- No need to keep products piled up in warehouses awaiting Wal-Mart's call. Invoicing and payments happen automatically too.
- The system saves Proctor & Gamble so much in time, reduced inventory and lower order-processing costs that it can afford to give Wal-Mart "everyday, low prices" without putting itself out of business.