

# Supply chain management

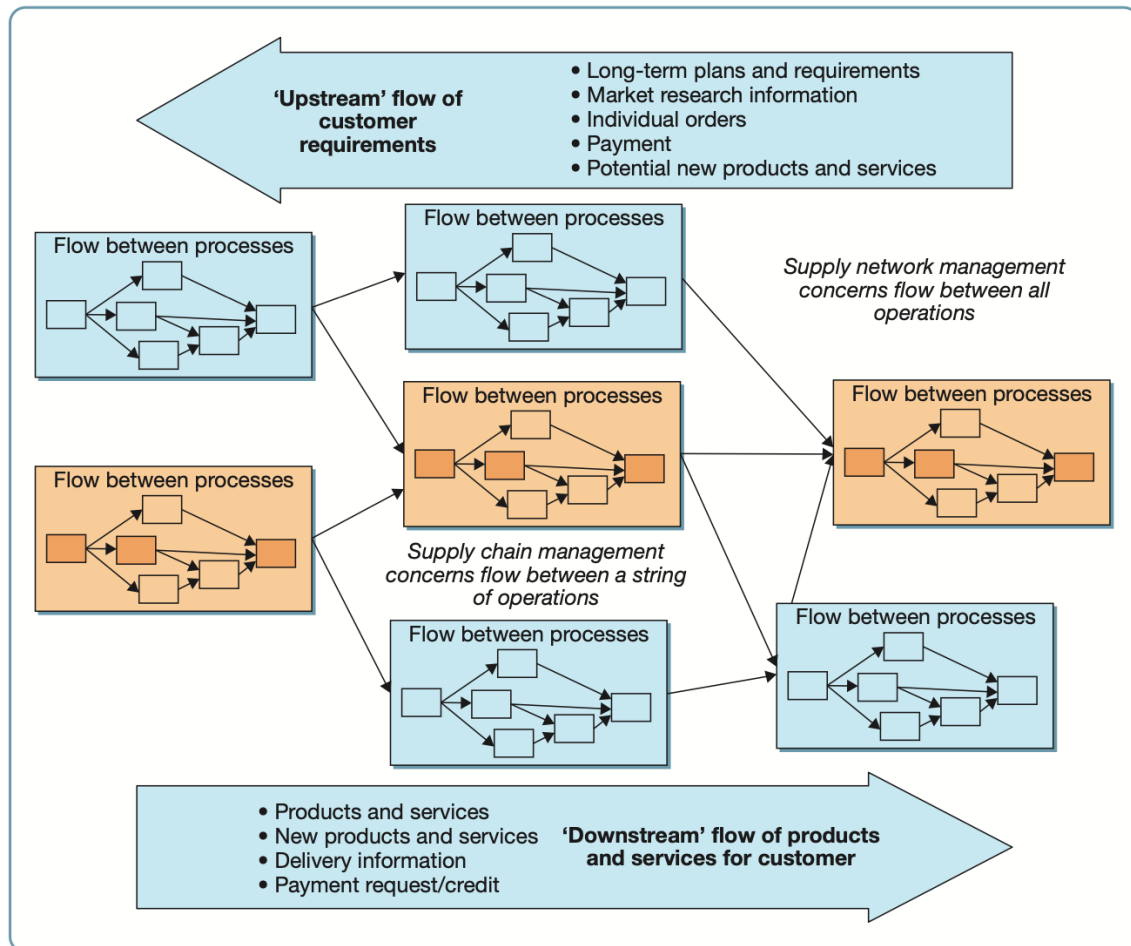
## 12.1 What is supply chain management?

**Supply chain management** = management of the relationships and flows between the string/chain of operations and processes that deliver value in the form of services and products to the ultimate consumer

**Supply networks** = can be many hundreds of supply chains of linked operations passing through a single operation

Most obvious failures in SCM occur when downstream product or service flows fail to meet customer requirements, the root causes may be failures in the upstream flows of information

SCM is very concerned with managing information flows (upstream and downstream) as it is with managing the flow of products and services



**Figure 12.2** Supply chain management is concerned with managing the flow of materials and information between a string of operations that form the strands or 'chains' of a supply network

**Material transformation operations** = operations concerned with the creation, movement, storage or sale of physical products

Supply chain management concepts apply to internal relationships between processes as well as the external relationships between operations

**Inventoried information can be different**

## **12.2 What is supply chain management?**

The objective of SCM is to satisfy the end customer. All stages in the various chains that form the supply network must eventually include consideration of the final customer no matter how far an individual operation is from the end customer

When a customer decides to make a purchase, they trigger action back along a whole series of supply chains in the network.

### **Performance objectives for supply networks**

**Quality** = the quality of a service/product when it reaches the customer is a function of the quality performance of every operation in the chain that supplied. Errors in each stage of the chain can multiply their effect on end-customer service. A supply network can achieve a high end-customer quality by every stage taking some responsibility for its own and its suppliers' performance

**Speed** = Speed has 2 meanings in supply chain context:

1. How fast customers can be served (the elapsed time between a customer requesting a service and receiving it in full). It can be achieved simply by over-resourcing or overstocking within the supply chain
2. Time taken for goods and services to move through the chain. Products that move quickly down a supply chain from raw material suppliers through to retailers will spend little time as inventory since to achieve fast throughput time, material cannot dwell for significant periods as inventory. It reduces the working capital requirements and other inventory costs in the supply chain so reducing the overall cost of delivering to the end customer

**Dependability** = one can almost guarantee on-time delivery by keeping excessive resources within the chain. Dependability of throughput time is more desirable aim because it reduces uncertainty within the network. If individual operations do not deliver as promised on time, there will be a tendency for customers to over-order or order early to provide insurance against late delivery

**Flexibility** = the network's ability to cope with changes and disturbances, often referred to as **supply chain agility**. Focuses on the end customer and ensuring fast throughput and responsiveness to customer needs.

**Cost** = there are costs incurred within each operation to transform its inputs into outputs, and the supply network as a whole incurs additional costs that derive from

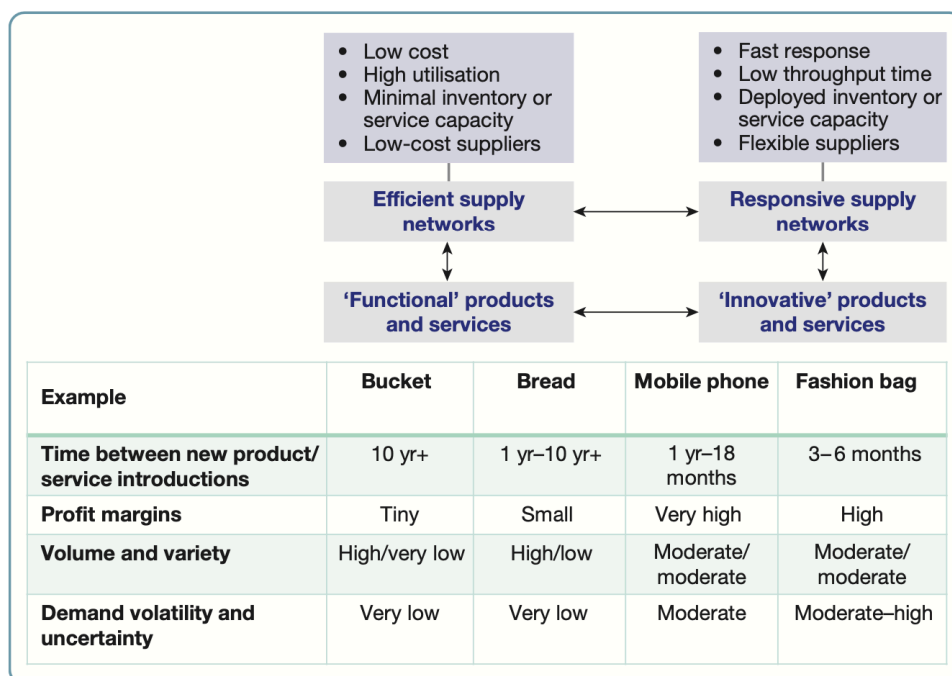
operations doing business with one another. Transaction costs include the costs of finding appropriate suppliers, setting up supplier agreements, running ongoing supply, dealing with failure, supplier training and potentially the costs of exiting an unsatisfactory relationship

## Lean versus agile supply networks

In SCM one can distinguish between services/products that are functional and those that are innovative.

**Functional services/products** = stable and predictable demand with lower margins. For functional offerings, **efficient/lean supply chain policies** are more appropriate and includes keeping service capacity or inventories low, especially in the downstream parts of the network, to maintain fast throughput. Focus on maximizing utilization of all resources in the supply network to minimize costs. Information must flow quickly up and down the chain to maximize the amount of time to adjust schedules efficiently

**Innovative services/products** = uncertain demand with higher profit margins. More suited to **responsive/agile supply chain policies** where the emphasis is on high service levels and responsive supply to the end customer. The service capacity or inventory in the network will be deployed as close as possible to the customer so the network can supply even when dramatic changes occur in customer demand. Fast throughput from the upstream parts of the network will need to replenish downstream operations



**Figure 12.5** Aligning product and service characteristics with supply network design

## 12.4 How is the supply side managed?

### Negotiating with suppliers during supplier selection

The approach to negotiation is naturally affected by initial decisions around performance priorities, supplier type (traditional vs partnership), and sourcing configuration (single, multi, delegated or parallel)

During negotiations between buyers and suppliers, several tactics are often in evidence such as emotion, logic, threat, bargaining and compromise

**Table 12.3** Common tactics used in buyer-supplier negotiations

	Considerations for using negotiation tactic
EMOTION	<ul style="list-style-type: none"><li>▶ Positive and negative emotions are extremely influential in 'framing' the negotiation</li><li>▶ Anger is the most common emotion in negotiation, but also the most damaging to potential settlement</li><li>▶ Positive emotions support collaborative approaches to negotiation</li><li>▶ Use emotions early in negotiation to maximise influence</li><li>▶ Be sincere and don't let emotions control you</li><li>▶ Use to increase 'perceived value' when bargaining</li></ul>
LOGIC	<ul style="list-style-type: none"><li>▶ Ensure your logic is credible and use one powerful argument rather than multiple weaker arguments</li><li>▶ Try to get your logic in before the other negotiating party</li><li>▶ Use logic to counter emotion-based tactics</li></ul>
THREAT	<ul style="list-style-type: none"><li>▶ Avoid threatening where possible and be credible with any threat</li><li>▶ If you do use threat, threaten the business rather than the person</li><li>▶ Discreet or veiled threats are less risky than explicit threats</li><li>▶ Use 'if' in any threat to give the opponent room to manoeuvre</li></ul>
BARGAINING	<ul style="list-style-type: none"><li>▶ Avoid exposing your position too early in negotiations</li><li>▶ Move in small and decreasing steps and extract return for any movement where possible</li><li>▶ Don't move too quickly and avoid appearing too keen to move</li></ul>
COMPROMISE	<ul style="list-style-type: none"><li>▶ Use compromise after other tactics</li><li>▶ Use extreme (but credible) position to maximise value when using compromise</li><li>▶ Avoid suggesting compromise too early in a negotiation as it shuts down more creative solutions and favours the other negotiating party</li></ul>

The **advocacy approach** where a negotiator advocates for one party to gain its most favorable outcome carries several risks such as an emphasis on short-term solutions at the expense of potential longer-term gains, personalized conflicts, damage to the buyer-supplier relationship and increased likelihood of a lose-lose outcome.

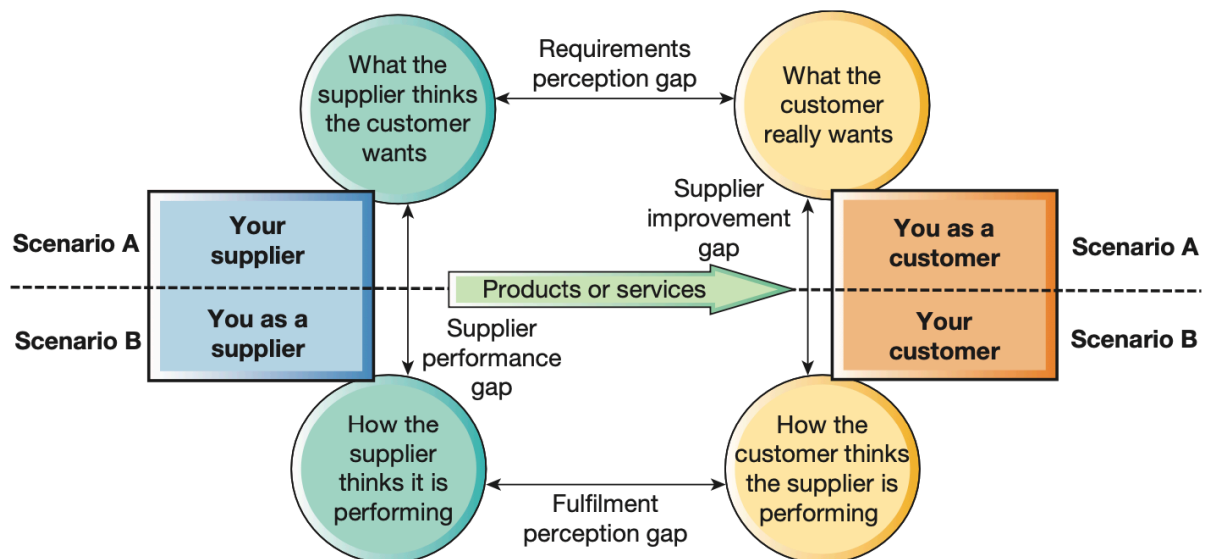
Alternative approach is **collaborative negotiation (principled negotiation, mutual gains bargaining)** which requires negotiators to adopt a mindset that emphasizes meeting the needs of both parties and involves a transparent process, investment in developing personal relationships, using creative brainstorming techniques and favoring longer-term win-win agreements

## Managing ongoing supply

Managing supply relationships is about both choosing the right suppliers and leaving them to get on with day-to-day supply as well as ensuring that mechanisms are in place that give suppliers the right (and consistent) information and encouragement to maintain smooth supply

### Perception differences in supply chain relationships

A big issue for successful SCM is the mismatch between how customers and suppliers perceive both what is required and how the relationship is performing



**Figure 12.9** Potential perception mismatches in supply chain relationships

In scenario A, the **customer perspective**, the customer has an idea about what he really wants from a supplier. It may not be formalized using a service-level agreement and is always hard to capture everything about what is required.

**Requirements perception gap** = the gap between how the customer describes what is required and how the supplier interprets it

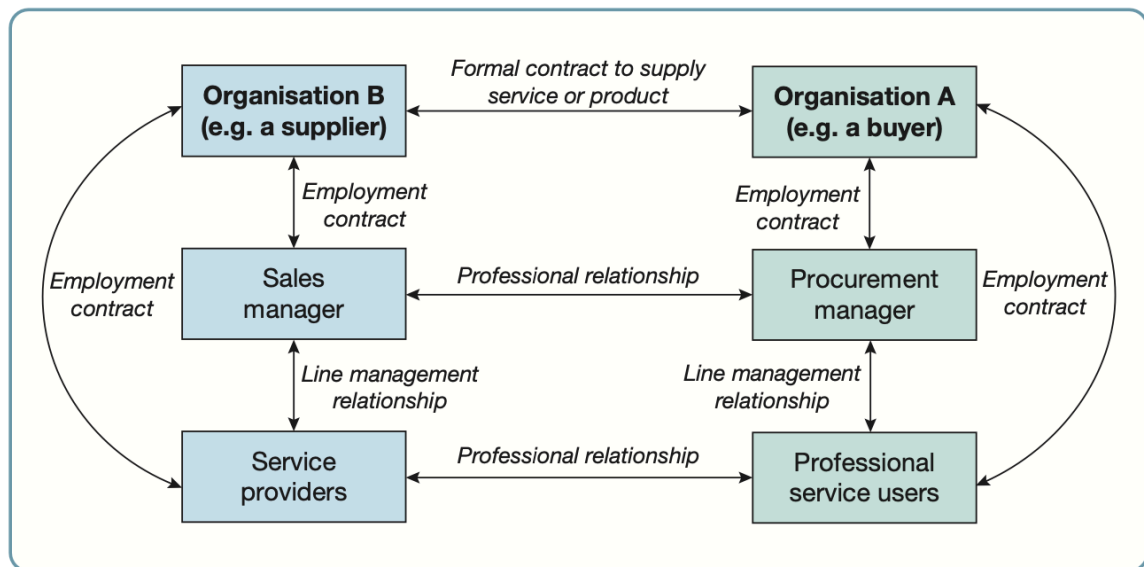
**Fulfilment perception gap** = misalignment between the customers view and how the supplier believes it is performing

**Supplier improvement gap** = the gap between what the customer wants from their supplier and how they perceive the supplier's performance. Influences the kind of supplier development goals set by the customer

**Supplier performance gap** = the gap between the supplier's perceptions of the customer's needs and its own assessment of performance. Indicates how a supplier initially sees itself improving its own performance

### Supply chain relationships are multi-tiered configurations

Supply chain relationships are multi-tiered configurations. A formal contract between 2 organizations in a supply network must be interpreted by managers in these organizations.



**Figure 12.10** Supply chain relationships are multi-tiered configurations

The service itself is then delivered by service personnel and received by service users.

At each of these levels there is a relationship which in turn are consistent in terms of attitudes, actions and perceptions.

Disconnects between that the organization wants its managers and employees to deliver and how the service is actually delivered on the ground can create problems in multi-tiered supply chain relationships

### Developing suppliers

It is in a customer's long-term interests to take responsibility for developing supplier capabilities since helping a supplier to improve both enhances the service from the supplier and also leads to greater supplier loyalty and long-term commitment.

The process of **supplier development** consists of 4 key stages:

1. **Select product/service and supplier for development** = suppliers that provide strategic products/services are likely candidates for development. Suppliers with weak current performance but with potential for improvement are appealing and also suppliers where switching costs are high
2. **Form a project team and gain buy-in for supplier development** = the project team should bring together key stakeholders from the buyer, supplier and other relevant parties. Gaining buy-in can require significant time, sensitivity and effort in the early stages of the supplier development process, especially if the supplier's management are defensive of development needs

3. **Agree goals and measures for supplier development** = clear scoping in terms of timelines, costs and key deliverables to ensure that both buyer and supplier agree on what constitutes success. Could involve risk evaluation
4. **Implement, monitor and learn** = the progress must be monitored and one must intervene if the project is deviating from its performance targets. It is important to celebrate success as it helps to reinforce the value of supplier development to all stakeholders. Learning from supplier development initiatives can be powerful in informing subsequent projects with other suppliers.

## **12.5 How is the demand side managed?**

### **Logistics services**

**Logistics** = the activity of moving products from suppliers to their customers. Managing logistics is a critical issue for product-oriented firms, but not for non-physical output-oriented firms. Especially when the costs of distribution account for a large proportion of their total costs

**First-party logistics** (1PL) = logistics activity is an entirely internal process, collecting products from a supplier or have its own fleet of vans to deliver to customers

**Second-party logistics** (2PL) = Outsourcing logistics services over a specific segment of supply chain. I.e hire a shipping company to transport and store products from a specific collection point to a specific destination.

**Third-party logistics** (3PL) = when a firm contracts a logistics company to work with other transport companies to manage their logistics operations more fully. Can involve transportation, warehousing, inventory management and even packaging or re-packaging products

**Fourth-party logistics** (4PL) = an integrator that assembles the resources, capabilities and technology of its own organization and other organizations to design, build and run comprehensive supply chain solutions'

**Fifth-party logistics** (5PL) = defining themselves as broadening their scope to **e-business**

### **Volume, size and value**

When selecting methods of transportation for logistics organizations consider the volume, size and value characteristics of their products.

Low volumes of small and high-value products adopts air freight

High volumes of bulky and low-value products uses maritime transportation

The cost of moving a given product from one location to another is highest for 1. Air, 2. Road, 3. Rail, 4. Water, 5. Pipeline

The choice may be influenced by **vertical trade-offs** = benefits that may change over time because of improvements in one method of transportation vs another

**Lateral trade-offs** = consider the balance between costs of a particular transportation method and possible benefits elsewhere

### **Logistics and the Internet of Things (IoT)**

**Internet of Things** = a network of physical objects that have electronics, software and sensors implanted in them that can gather and exchange data. Combined with global positioning systems (GPS) it permits instantaneous tracking of trucks, materials and people allowing logistics companies, suppliers and customers to share knowledge of where products are in the network and where they are going next

It enables **track-and-trace** technologies so package distributions companies can inform and reassure customers that their service is being delivered as promised

### **Customer relationship management (CRM)**

**Customer relationship management** = a method of learning more about customers' needs and behaviors to develop stronger relationships with them. It brings together all the disparate information about customers to gain insight into their behavior and their value to the business and also helps to sell services more effectively and increase revenues by:

- Providing offerings that are more closely aligned to customer needs
  - Retaining existing customers and discovering new ones
    - Offering better customer service
    - Cross selling services more effectively

CRM helps organization understand who their customers are and what their value is over a lifetime by building several steps into its customer interface processes:

1. Determining the needs of the customer and how to best meet those needs
2. Examine all the different ways and parts of the organization where customer-related information is collected, stored and used
3. All customer-related data must be analyzed to obtain a holistic view of each customer and identify where service can be improved.

## **12.6 What are the dynamics of supply chains?**

**Bullwhip effect** = dynamics that exist between firms in supply chains that cause errors, inaccuracies and volatility and increase the operations further upstream. A small disturbance at one end of the chain causes increasingly large disturbances as it works its way towards the other end.

It is caused because of a rational desire by the different links in the supply chain to manage their levels of service activity and inventory sensibly.



All stages in the supply chain work on the principle that they will keep in stock one period's demand since many operations gear their inventory levels or service capacity to their demand rate.

**Table 12.4** Fluctuations of production levels along supply chain in response to small change in end-customer demand (Starting stock (a) + production (b) = finishing stock (c) + demand, that is production in previous tier down (d): see explanation in text. Note all stages in the supply chain keep one period's inventory,  $c = d$ .)

Period	Third-tier supplier		Second-tier supplier		First-tier supplier		Original equipment mfr		Demand
	Prodn	Stock	Prodn	Stock	Prodn	Stock	Prodn	Stock	
1	100	100	100	100	100	100	100	100	100
		100		100		100		100	
2	20	100	60	100	80	100	90	100	95
		60		80		90		95	
3	180	60	120	80	100	90	95	95	95
		120		100		95		95	
4	60	120	90	100	95	95	95	95	95
		90		95		95		95	
5	100	90	95	95	95	95	95	95	95
		95		95		95		95	
6	95	95	95	95	95	95	95	95	95
		95		95		95		95	

Factors that make the fluctuations more pronounced include lack of forecasting, errors in forecasting, quantity discounting (encourages less-frequent but larger orders), price fluctuations, time lags between the flows of information (order) and flow of materials or service provision (deliveries), variable delivery times and panic ordering in anticipation of shortages or in reaction to them

**Supply chain dynamics** = have several harmful impacts on those operating in a supply network. Includes the costs of outsized facilities and excess inventories to deal with demand spikes that are then often underutilized.

- Human resources – service capacity oscillates between underutilization and overutilization. Many firms hire, fire and re-hire employees as they experience the volatile demand patterns caused by the bullwhip effect
- Irregular patterns of work cause inefficiencies, delays and both customer and staff dissatisfaction

The bullwhip effect is even more extreme when the end-customer demand is unstable.

The bullwhip effect can be more pronounced within service supply networks compared to more product-oriented contexts. Factors that may worsen service bullwhips include:

- Lack of accurate data on current rework volumes within a supply chain that would otherwise help to signal the likely formation of new bullwhip effects
- Disruption caused by manual rework in many automated service environments
  - Lower levels of supply network coordination limit the speed of reaction to emergent bullwhip problems

### **Controlling supply chain dynamics**

Supply chain performance is improved firstly by attempting to reduce the bullwhip effect, which is done by coordinating the activities of the operations in the chain in several ways

**Channel alignment in supply networks** = the adjustment of scheduling, material movements, stock levels, pricing and other sales strategies to bring all the operations in the chain into line with each other. The systems and methods of planning and control decision-making are harmonized through the chain.

- **Vendor-managed inventory** = a way of avoiding the same information, differences in the forecasting methods or purchasing practices that lead to fluctuations in orders between operations in the chain, by **allowing an upstream supplier to manage the inventories of its downstream customer**

**Operational efficiency in supply networks** = the efforts that each operation in the chain makes to reduce its own complexity, the cost of doing business with other operations in the chain, and its throughput time. Cumulative effect is to simplify throughput in the whole chain. A chain whose operations had high levels of operations performance would be more predictable and have faster throughput, both of which would help to minimize supply chain fluctuations

**Information sharing** = making information on end-customer demand available to upstream operations.