



Source: Tibbett and Britten

Chapter 13

Supply chain planning and control

Introduction

Operations managers have to look beyond an internal view if they want to manage their operations effectively. As operations outsource many of their activities and buy more of their services and materials from outside specialists, the way they manage the supply of products and services to their operations becomes increasingly important, as does the integration of their distribution activities. Even beyond this immediate supply chain, there are benefits from managing the flow between customers' customers and suppliers' suppliers. This activity is now commonly termed *supply chain management*. In Chapter 6 we raised the strategic and structural issues of supply network management; this chapter considers the more 'infrastructural' issues of planning and controlling the individual chains in the supply network (see Figure 13.1).

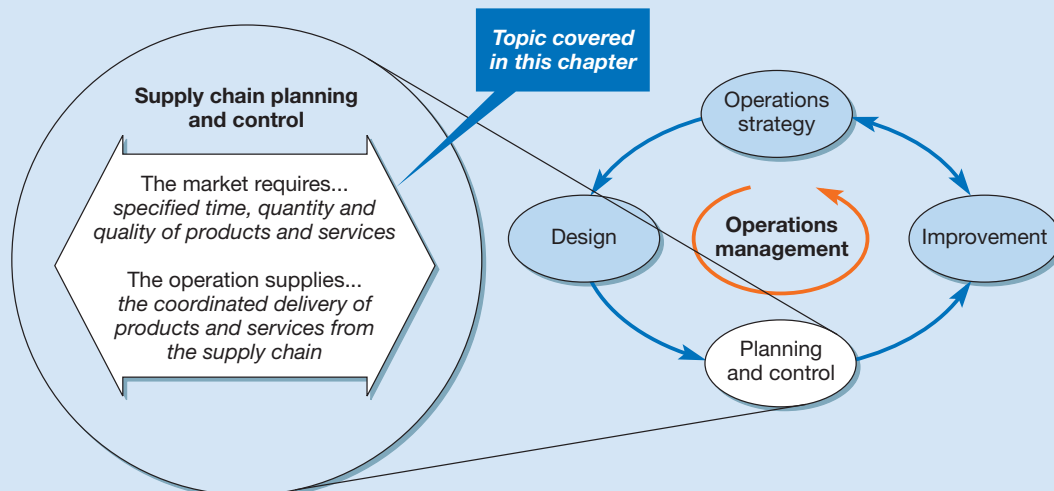


Figure 13.1 This chapter covers supply chain planning and control

Key questions ???

- What is supply chain management and its related activities?
- How can the relationship between operations in a supply chain affect the way it works?
- Are different supply chain objectives needed in different circumstances?
- How do supply chains behave in practice?

Operations in practice

Suppliers are vital to Lucent's success¹

Lucent Technologies (recently merged with Alcatel) designs and delivers the networks that provide the infrastructure for the internet. It is a high-tech player in a high-tech industry and at the heart of its technology research is the world-famous Bell Labs whose scientists have won six Nobel Prizes. Yet it still needs close working relationships with a group of carefully chosen suppliers. *'We operate in a market that moves at light speed,'* says the company. *'It is vitally important for Lucent to be able to rely upon our suppliers to provide the materials and services we need, so that we can deliver to our customers the solutions they need, when they need them, and at a price they can afford. Being a Lucent supplier is much more than being a reliable source for quality materials and services at a competitive price. We look to our suppliers to work beside us, from product design all the way through to the point of delivery to the customer and even beyond'.*

The company's Supply Relationships Programme manages the whole supply chain from suppliers through to customers (and customers' customers) including:

- evaluating suppliers to determine their qualification to be a supplier;
- providing suppliers with a single contact point within Lucent;
- providing a web-based Supply Chain Portal for members of the supply chain network to receive a clear view of demand, availability and the state of delivery;
- organizing supplier forums to find ways of cutting costs, reducing time to market and improving delivery.



Source: Corbis/James Leynse

Lucent's award-winning supply chain practices have brought its rewards, with profit margins increased, inventory cut and components costs reduced. *'When we looked at our supply chain situation,'* says Chief Operating Officer Bob Holder, *'we recognized how fragmented it had become. We had decentralized manufacturing, inventory and purchasing. We had six different organizations buying the same memory chips. We said, this just doesn't make sense. So we created the supply chains networks.'*

Communications are also important to the company's supply chain approach. It tells suppliers of their future plans, believing that when potential changes are discussed openly, the company will have more credibility with its suppliers as well as 'more respect and a deeper and richer relationship'. Lucent's supply chain policies also include a commitment to 'supply chain diversity'. This means giving maximum opportunity to suppliers owned by ethnic minorities, women and service-disabled veterans to participate in its supply chain.

What is supply chain management?

A supply network is all the operations linked together to provide goods and services

The network of supplier and customer operations that have relationships with an operation.

A supply chain is a strand of linked operations

A linkage or strand of operations that provides goods and services through to end customers; within a supply network several supply chains will cross through an individual operation.

Supply chain pipeline

A linkage or strand of operations that provides goods and services through to end customers; within a supply network several supply chains will cross through an individual operation.

Supply chain management is the management of the interconnection of organizations that relate to each other through upstream and downstream linkages between the processes that produce value to the ultimate consumer in the form of products and services. It is a holistic approach to managing across company boundaries. In Chapter 6 we used the term ‘**supply network**’ to refer to all the operations that were linked together so as to provide goods and services through to the end customers. In this chapter we deal with the ‘ongoing’ flow of goods and services through this network along individual channels or strands of that network. In large organizations there can be many hundreds of strands of linked operations passing through the operation. These strands are more commonly referred to as **supply chains**. An analogy often used to describe supply chains is that of the ‘pipeline’. Just as oil or other liquids flow through a pipeline, so physical goods (and services, but the metaphor is more difficult to imagine) flow down a supply chain. Long pipelines will, of course, contain more oil than short ones. So, the time taken for oil to flow all the way through a long pipeline will be longer than if the pipeline were shorter. Stocks of inventory held in the supply chain can be thought of as analogous to oil storage tanks. On their journey through the **supply chain pipeline**, products are processed by different operations in the chain and also stored at different points.

Supply chain management objectives

All supply chain management shares one common, and central, objective – to satisfy the end customer. All stages in a chain 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, he or she triggers action back along the whole chain. All the businesses in the supply chain pass on portions of that end customer’s money to each other, each retaining a margin for the value it has added. Each operation in the chain should be satisfying its own customer, but also making sure that eventually the end customer is satisfied.



For a demonstration of how end customer perceptions of supply satisfaction can be very different from that of a single operation, examine the customer ‘decision tree’ in Figure 13.2. It charts the hypothetical progress of 100 customers requiring service (or products) from a business (for example, a printer requiring paper from an industrial paper stockist). Supply performance, as seen by the core operation (the warehouse), is represented by the shaded part of the diagram. It has received 20 orders, 18 of which were ‘produced’ (shipped to customers) as promised (on time and in full). However, originally 100 customers may have requested service, 20 of whom found the business did not have appropriate products (did not stock the right paper), 10 of whom could not be served because the products were not available (out of stock), 50 of whom were not satisfied with the price and/or delivery (of whom 10 placed an order notwithstanding). Of the 20 orders received, 18 were produced as promised (shipped) but 2 were not received as promised (delayed or damaged in transport). So what seems a 90 per cent supply performance is in fact an 8 per cent performance from the customer’s perspective.



This is just one operation in a whole network. Include the cumulative effect of similar reductions in performance for all the operations in a chain and the probability that the end customer is adequately served could become remote. The point here is not that all supply chains have unsatisfactory supply performances (although most supply chains have considerable potential for improvement). Rather it is that the performance both of the supply chain as a whole and its constituent operations should be judged in terms of how all end customer needs are satisfied.

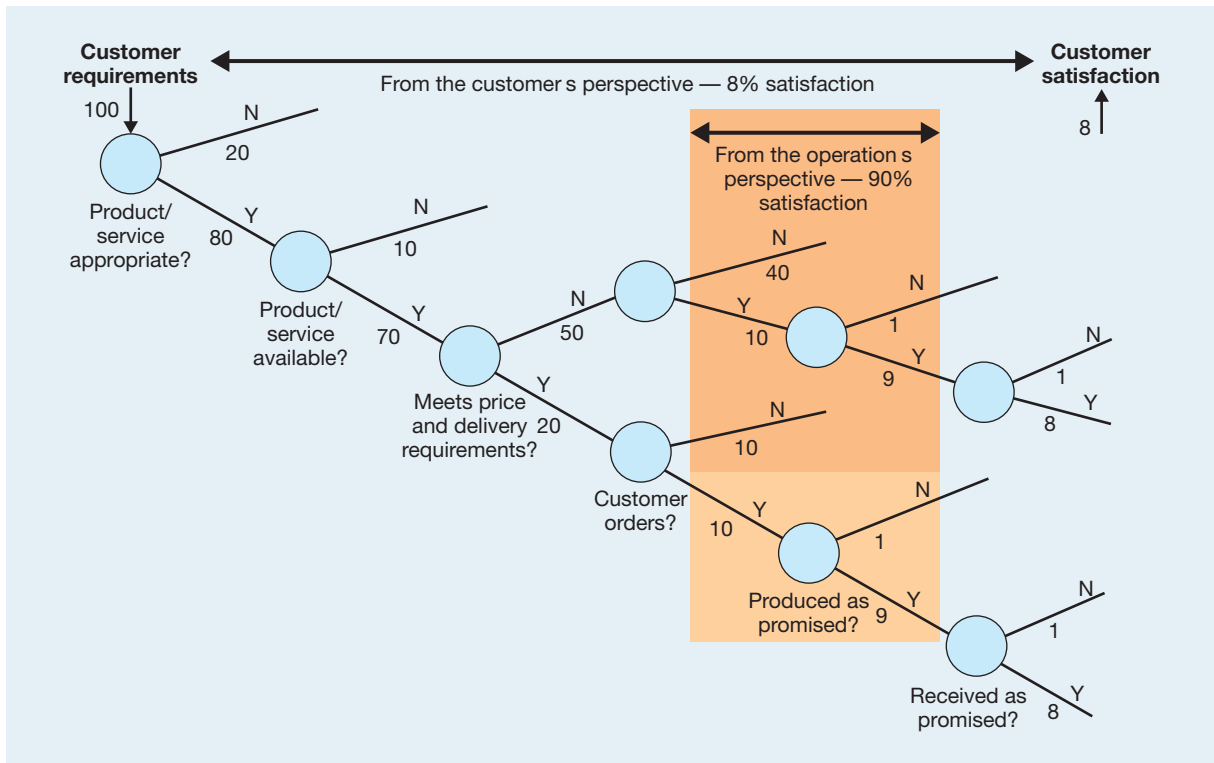


Figure 13.2 Taking a customer perspective of supply chain performance can lead to very different conclusions

Supply chain objectives

The objective of supply chain management is to meet the requirements of end customers by supplying appropriate products and services when they are needed at a competitive cost. Doing this requires the supply chain to achieve appropriate levels of the five operations performance objectives: quality, speed, dependability, flexibility and cost.

Quality – the quality of a product or service when it reaches the customer is a function of the quality performance of every operation in the chain that supplied it. The implication of this is that errors in each stage of the chain can multiply in their effect on end customer service (if each of seven stages in a supply chain has a 1 per cent error rate, only 93.2 per cent of products or services will be of good quality on reaching the end customer (i.e. 0.99^7). This is why, only by every stage taking some responsibility for its own *and its suppliers'* performance, can a supply chain achieve high end customer quality.

Speed – this has two meanings in a supply chain context. The first is how fast customers can be served (the elapsed time between a customer requesting a product or service and receiving it in full), an important element in any business's ability to compete. However, fast customer response can be achieved simply by over-resourcing or over-stocking within the supply chain. For example, very large stocks in a retail operation can reduce the chances of stock-out to almost zero, so reducing customer waiting time virtually to zero. Similarly, an accounting firm may be able to respond quickly to customer demand by having a very large number of accountants on standby waiting for demand that may (or may not) occur. An alternative perspective on speed is the time taken for goods and services to move through the chain. So, for example, products that move quickly down a supply chain from raw material suppliers through to retailers will spend little time as inventory because to achieve fast throughput time, material cannot dwell for significant periods as inventory. This in turn reduces the working capital requirements and other inventory costs in the supply chain, so

reducing the overall cost of delivering to the end customer. Achieving a balance between speed as responsiveness to customers' demands and speed as fast throughput (although they are not incompatible) will depend on how the supply chain is choosing to compete.

Dependability – in a supply chain context this is similar to speed in so much as one can almost guarantee 'on-time' delivery by keeping excessive resources, such as inventory, within the chain. However, dependability of throughput time is a much more desirable aim because it reduces uncertainty within the chain. If the individual operations in a chain do not deliver as promised on time, there will be a tendency for customers to over-order, or order early, in order to provide some kind of insurance against late delivery. The same argument applies if there is uncertainty regarding the *quantity* of products or services delivered. This is why delivery dependability is often measured as 'on time, in full' in supply chains.

Flexibility – in a supply chain context this is usually taken to mean the chain's ability to cope with changes and disturbances. Very often this is referred to as supply chain agility. The concept of agility includes previously discussed issues such as focusing on the end customer and ensuring fast throughput and responsiveness to customer needs. But in addition, agile supply chains are sufficiently flexible to cope with changes, either in the nature of customer demand or in the supply capabilities of operations within the chain.

Cost – in addition to the costs incurred within each operation to transform its inputs into outputs, the supply chain as a whole incurs additional costs that derive from each operation in a chain doing business with each other. These transaction costs may include such things as the costs of finding appropriate suppliers, setting up contractual agreements, monitoring supply performance, transporting products between operations, holding inventories and so on. Many of the recent developments in supply chain management, such as partnership agreements or reducing the number of suppliers, are an attempt to minimize transaction costs.

The activities of supply chain management

Some of the terms used in supply chain management are not universally applied. Furthermore, some of the concepts behind the terminology overlap in the sense that they refer to common parts of the total supply network. This is why it is useful first of all to distinguish between the different terms we shall use in this chapter. These are illustrated in Figure 13.3. *Supply chain management* coordinates all the operations on the supply side and the demand side. *Purchasing and supply management* deals with the operation's interface with its supply markets. *Physical distribution management* is the activity of supplying immediate customers. *Logistics* is an extension of physical distribution management and usually refers to the management of materials and information flow from a business, down through a distribution channel, to the retail store or direct to consumers (increasingly common because of the growth of internet-based retailing). The term *third-party logistics* is sometimes used to indicate that the management of the logistics chain is outsourced to a specialist logistics company. *Materials management* is a more limited term than supply chain management and refers to the management of the flow of materials and information through the immediate supply chain, including purchasing, inventory management, stores management, operations planning and control and physical distribution management.

Purchasing (procurement) and supply management

At the supply end of the business, **purchasing** (sometimes called 'procurement') buys in materials and services from suppliers. Typically the volume and value of these purchases are increasing as organizations concentrate on their 'core tasks'. Purchasing managers provide a vital link between the operation itself and its suppliers. They must understand the require-

Purchasing

The organizational function, often part of the operations function, that forms contracts with suppliers to buy in materials and services.

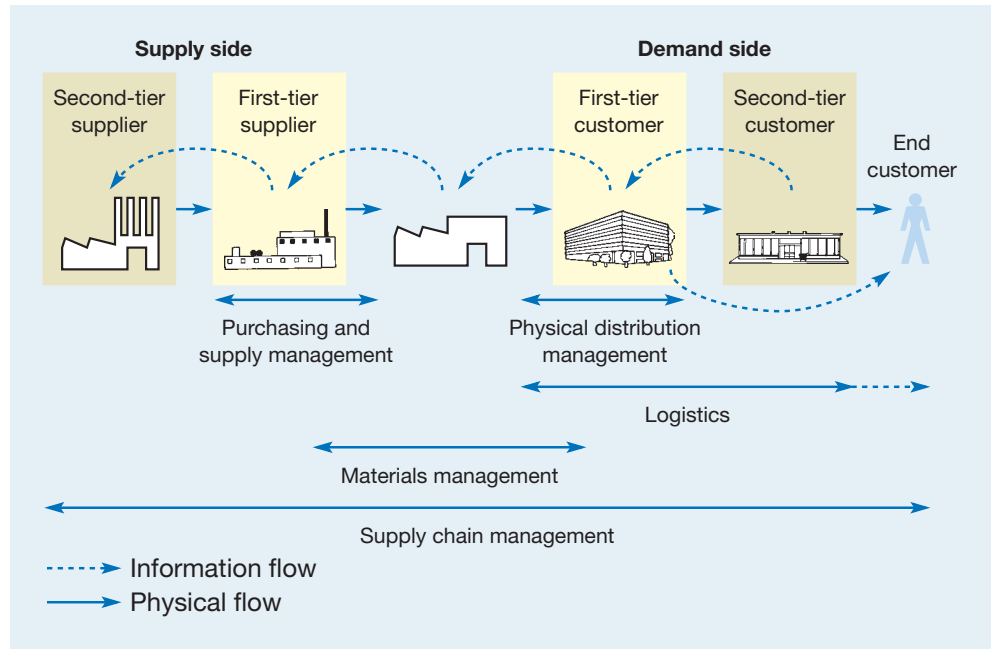


Figure 13.3 Some of the terms used to describe the management of different parts of the supply chain

ments of all the processes within the operation and also the capabilities of the suppliers (sometimes thousands in number) who could potentially provide products and services for the operation. Figure 13.4 shows a simplified sequence of events in the management of a typical supplier–operation interaction which the purchasing function must facilitate. When the operation requests products or services, purchasing uses its knowledge of the market to identify potential suppliers. Potential suppliers are asked to prepare quotations. The purchasing function then prepares a purchase order (important because it often forms the legal basis of the contractual relationship between the operation and its supplier). The purchasing function needs to coordinate with the operation over the technical details of the purchase order, after which the supplier produces and delivers the products or services to the operation.

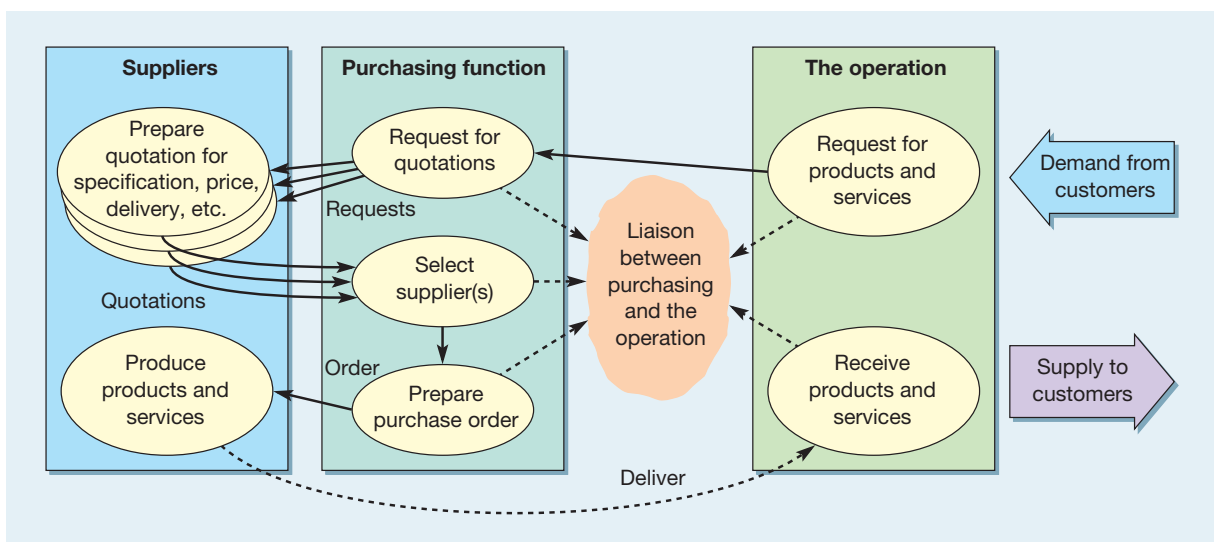


Figure 13.4 The purchasing function brings together the operation and its suppliers

Purchasing can have a significant impact on any operation's costs and therefore profits. To illustrate the impact that price-conscious purchasing can have on profits, consider a simple manufacturing operation with the following financial details:

Total sales	£10,000,000
Purchased services and materials	£7,000,000
Salaries	£2,000,000
Overheads	£500,000

Therefore, profit = £500,000. Profits could be doubled to £1 million by any of the following:

- increase sales revenue by up to 100 per cent;
- decrease salaries by 25 per cent;
- decrease overheads by 100 per cent;
- decrease purchase costs by 7.1 per cent.

A doubling of sales revenue does sometimes occur in very fast-growing markets, but this would be regarded by most sales and marketing managers as an exceedingly ambitious target. Decreasing the salaries bill by a quarter is likely to require substantial alternative investment – for example, in automation – or reflects a dramatic reduction in medium- to long-term sales. Similarly, a reduction in overheads by 100 per cent is unlikely to be possible over the short to medium term without compromising the business. However, reducing purchase costs by 7.1 per cent, although a challenging objective, is usually far more of a realistic option than the other actions. The reason purchase price savings can have such a dramatic impact on total profitability is that purchase costs are such a large proportion of total costs. The higher the proportion of purchase costs, the more profitability can be improved in this way. Figure 13.5 illustrates this.

Supplier selection

Choosing appropriate suppliers should involve trading off alternative attributes. Rarely are potential suppliers so clearly superior to their competitors that the decision is self-evident. Most businesses find it best to adopt some kind of supplier 'scoring' or assessment procedure. This should be capable of rating alternative suppliers in terms of factors such as those in Table 13.1.

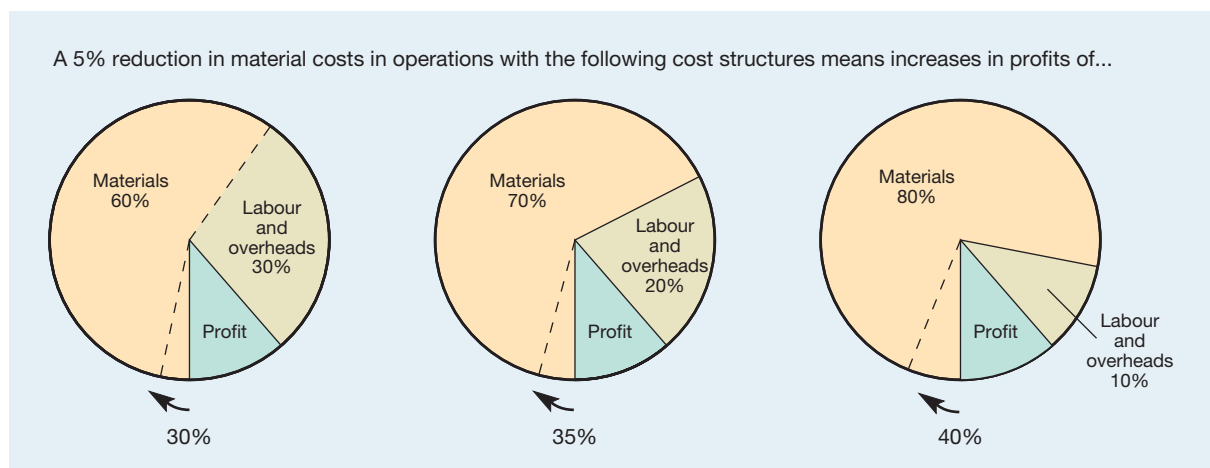


Figure 13.5 The larger the level of material costs as a proportion of total costs, the greater the effect on profitability of a reduction in material costs

Short case Ford Motors' team value management²

Purchasing managers are a vital link between an operation and its suppliers. But they work best when teamed up with mainstream operations managers who know what the operation really needs, especially if, between them, they take a role that challenges previous assumptions. That is the basis behind Ford Motor Company's 'team value management' (TVM) approach. Reputedly, it all started when Ford's Head of Global Purchasing, David Thursfield, discovered that a roof rack designed for one of Ford's smaller cars was made of plastic-coated aluminium and capable of bearing 100 kg load. This prompted the questions, 'Why is this rack covered in plastic? Why would anyone want to put 100 kg on the roof of a car that small?' He found that no one had ever questioned the original specification. When Ford switched to using steel roof racks capable of bearing a smaller weight, it halved the cost. 'It is important,' he says, 'to check whether the company is getting the best price for parts and raw material that provide the appropriate level of performance without being too expensive.'

The savings in a large company such as Ford can be huge. Often in multi-nationals, each part of the business makes sourcing and design decisions independently and does not exploit opportunities for cross-usage of components. The TVM approach is designed to bring together engineering and purchasing staff and identify where cost can be taken out of purchased parts and



where there is opportunity for parts commonality (see Chapter 5) between different models. When a company's global purchasing budget is \$75 billion like Ford's, the potential for cost savings is significant.

Questions

- 1 How do you think Ford's suppliers will react to the TVM initiative?
- 2 As well as obvious savings in the cost of bought-in parts, do you think the TVM initiative could result in savings for Ford's sales dealerships and service centres?

Table 13.1 Factors for rating alternative suppliers

<i>Short-term ability to supply</i>	<i>Longer-term ability to supply</i>
Range of products or services provided	Potential for innovation
Quality of products or services	Ease of doing business
Responsiveness	Willingness to share risk
Dependability of supply	Long-term commitment to supply
Delivery and volume flexibility	Ability to transfer knowledge as well as products and services
Total cost of being supplied	Technical capability
Ability to supply in the required quantity	Operations capability
	Financial capability
	Managerial capability

Supplier selection

Choosing **suppliers** should involve evaluating the relative importance of all these factors. So, for example, a business might choose a supplier who, although more expensive than alternative suppliers, has an excellent reputation for on-time delivery because that is more appropriate to the way the business competes itself, or because the high level of supply dependability allows the business to hold lower stock levels, which may even save costs overall. Other trade-offs may be more difficult to calculate. A potential supplier may have high levels of technical capability but may be financially weak, with a small but finite risk of going out of business. Other suppliers may have little track record of supplying the products or services required, but show the managerial talent and energy for potential customers to view developing a supply relationship as an investment in future capability.

Worked example

A hotel chain has decided to change its supplier of cleaning supplies because its current supplier has become unreliable in its delivery performance. The two alternative suppliers that it is considering have been evaluated, on a 1–10 scale, against the criteria shown in Table 13.2. That also shows the relative importance of each criterion, also on a 1–10 scale. Based on this evaluation, Supplier B has the superior overall score.

Table 13.2 Weighted supplier selection criteria for the hotel chain

Factor	Weight	Supplier A score	Supplier B score
Cost performance	10	8 (8×10=80)	5 (5×10=50)
Quality record	10	7 (7×10=70)	9 (9×10=90)
Delivery speed promised	7	5 (5×7=35)	5 (5×7=35)
Delivery speed achieved	7	4 (4×7=28)	8 (8×7=56)
Dependability record	8	6 (6×8=48)	8 (8×8=64)
Range provided	5	8 (8×5=40)	5 (5×5=25)
Innovation capability	4	6 (6×4=24)	9 (9×4=36)
Total weighted score		325	356

Single- and multi-sourcing

An important decision facing most purchasing managers is whether to source each individual product or service from one or more than one supplier, known, respectively, as **single-sourcing** and **multi-sourcing**. Some of the advantages and disadvantages of single- and multi-sourcing are shown in Table 13.3.

It may seem as though companies which multi-source do so exclusively for their own short-term benefit. However, this is not always the case: multi-sourcing can bring benefits to both supplier and purchaser in the long term. For example, Robert Bosch GmbH, the German automotive components business, required that sub-contractors do no more than 20 per cent of their total business with them. This was to prevent suppliers becoming too dependent and to allow volumes to fluctuate without pushing the supplier into bankruptcy. However, there has been a trend for purchasing functions to reduce the number of companies supplying any one part or service.

Purchasing, the internet and e-procurement

For some years, businesses have used electronic means to confirm purchased orders and ensure payment to suppliers. The rapid development of the internet, however, opened up the potential for far more fundamental changes in purchasing behaviour. Partly this was as the result of supplier information made available through the internet. By making it easier to search for alternative suppliers, the internet changed the economics of the search process and offered the potential for wider searches. It also changed the economics of scale in purchasing. For example, purchasers requiring relatively low volumes find it easier to group together in order to create orders of sufficient size to warrant lower prices.

E-procurement is the generic term used to describe the use of electronic methods in every stage of the purchasing process from identification of requirement through to payment, and potentially to contract management.³ Many of the large automotive, engineering and petrochemical companies have adopted such an approach. Typical of these companies' motives are those put forward by Shell Services International, part of the petrochemical giant:⁴ *'Procurement is an obvious first step in e-commerce. First, buying through the web is so slick and*

Single-sourcing

The practice of obtaining all of one type of input product, component, or service from a single supplier, as opposed to multi-sourcing.

Multi-sourcing

The practice of obtaining the same type of product, component, or service from more than one supplier in order to maintain market bargaining power or continuity of supply.

E-procurement

The use of the internet to organize purchasing, this may include identifying potential suppliers and auctions as well as the administrative tasks of issuing orders etc.

Table 13.3 Advantages and disadvantages of single- and multi-sourcing

	<i>Single-sourcing</i>	<i>Multi-sourcing</i>
<i>Advantages</i>	Potentially better quality because more supplier quality assurance (SQA) possibilities Strong relationships which are more durable Greater dependency encourages more commitment and effort Better communication Easier to cooperate on new product/service development More scale economies Higher confidentiality	Purchaser can drive down price by competitive tendering Can switch sources in case of supply failure Wide sources of knowledge and expertise to tap
<i>Disadvantages</i>	More vulnerable to disruption if a failure to supply occurs Individual supplier more affected by volume fluctuations Supplier might exert upward pressure on prices if no alternative supplier is available	Difficult to encourage commitment by supplier Less easy to develop effective SQA More effort needed to communicate Suppliers less likely to invest in new processes More difficult to obtain scale economies

cheap compared to doing it almost any other way. Second, it allows you to aggregate, spend and ask: Why am I spending this money, or shouldn't I be getting a bigger discount? Third, it encourages new services like credit, insurance and accreditation to be built around it.'

Generally the benefits of e-procurement are taken to include the following:

- it promotes efficiency improvements (the way people work) in purchasing processes;
- it improves commercial relationships with suppliers;
- it reduces the transaction costs of doing business for suppliers;
- it opens up the marketplace to increased competition and therefore keeps prices competitive;
- it improves a business's ability to manage its supply chain more efficiently.

The benefits of e-procurement go beyond reducing costs

Note how lowering prices (purchase costs to the buyer) is only one of **the benefits of e-procurement**. The cost savings from purchased goods may be the most visible advantages of e-procurement, but some managers say it is just the tip of the iceberg. It can also be far more efficient because purchasing staff are no longer chasing purchase orders and performing routine administrative tasks. Much of the advantage and time savings comes from the decreased need to re-enter information, from streamlining the interaction with suppliers and from having a central repository for data with everything contained in one system. Purchasing staff can negotiate with vendors faster and more effectively. On-line auctions can compress negotiations from months to one or two hours, or even minutes. Also, because everyone gets to see what the current bids are, the suppliers know how their bids stack up to those of their competitors. Lucent's (see opening example to this chapter) Vice President of Purchasing sees e-procurement as being hugely important. *'When I think about the strides we have made in speed, efficiency and employee productivity it is incredible. With e-procurement, you get a standard interface [for purchasing] and eliminate redundancies. It is tremendously efficient – particularly from a time standpoint – because you eliminate paper approvals and procedures. There is a substantial reduction in transaction processing costs. Thanks to e-procurement, Lucent will achieve – or surpass – the 60 per cent to 70 per cent reduction in transaction processing time it set forth in its business plan. Everyone is trying to come up with a more effective cost structure to control spending. But if you don't have an efficient e-procurement platform, it is hard to understand where you are and hard to control costs. You can't take action unless you know where you are bleeding. When all the data is in one place, you can see problems quicker and easier and take the right action.'*

Electronic marketplaces

E-procurement has grown largely because of the development over the last ten years of electronic marketplaces (also sometimes called infomediaries or cybermediaries). These operations that have emerged in business-to-business commerce offer services to both buyers and sellers. They have been defined as ‘an information system that allows buyers and sellers to exchange information about prices and product (and service) offerings, and the firm operating the electronic marketplace acts as an intermediary’.⁵ They can be categorized as consortium, private or third party.

- A private e-marketplace is where the buyer or seller conducts business in the market only with its partners and suppliers by previous arrangement.
- The consortium e-marketplace is where several large businesses combine to create an e-marketplace controlled by the consortium.
- A third-party e-marketplace is where an independent party creates an unbiased, market-driven e-marketplace for buyers and sellers in an industry.

The scope of e-procurement

The influence of the internet on purchasing behaviour is not confined to when the trade actually takes place over the internet. It is also an important source of purchasing information, even if the purchase is actually made by using more traditional methods. Also, because many businesses have gained advantages by using e-procurement, it does not mean that everything should be bought electronically. When a business purchases very large amounts of strategically important products or services, it will negotiate multi-million-euro deals, which involve months of discussion, arranging for deliveries up to a year ahead. In such environments, e-procurement adds little value. Deciding whether to invest in e-procurement applications (which can be expensive) say some authorities depends on what is being bought. For example, simple office supplies such as pens, paper clips and copier paper may be appropriate for e-procurement, but complex, made-to-order engineered components are not. Four questions seem to influence whether e-procurement will be appropriate.⁶

- *Is the value of the spend high or low?* High spending on purchased products and services gives more potential for savings from e-procurement.
- *Is the product or commodity highly substitutable or not?* When products and services are ‘substitutable’ (there are alternatives), e-procurement can identify and find lower-cost alternatives.
- *Is there a lot of competition or a little?* When several suppliers are competing, e-procurement can manage the process of choosing a preferred supplier more effectively and with more transparency.
- *How efficient are your internal processes?* When purchasing processes are relatively inefficient, e-procurement’s potential to reduce processing costs can be realized.

Critical commentary

Not everyone is happy with e-procurement. Some see it as preventing the development of closer partnership-type relationships which, in the long run, could bring far greater returns. Some Japanese car makers, in particular, are wary of too much involvement in e-procurement. For example, while Toyota Motor, the world’s third largest car maker, did join up with Ford, General Motors and Daimler-Chrysler in a web-based trade exchange, it limits its purchases to trading in such items as bolts, nuts and basic office supplies. The main reason for its reluctance is that traditionally it has gained a competitive edge by building long-term relationships with its suppliers. This means establishing trust, getting an understanding of a trading partner’s aspirations and not squeezing every last cent out of them in the short term (see the discussion on partnership relationships later). Taking this approach, e-procurement which is used primarily to drive down cost could do more harm than good.⁷

Global sourcing

One of the major supply chain developments of recent years has been the expansion in the proportion of products and (occasionally) services which businesses are willing to source from outside their home country. This is called **global sourcing**. It is the process of identifying, evaluating, negotiating and configuring supply across multiple geographies. Traditionally, even companies which exported their goods and services all over the world (that is, they were international on their demand side) still sourced the majority of their supplies locally (that is, they were not international on their supply side). This has changed – companies are now increasingly willing to look further afield for their supplies and for very good reasons. Most companies report a 10–35 per cent cost saving by sourcing from low-cost-country suppliers.⁸ There are a number of other factors promoting global sourcing.

- The formation of trading blocs in different parts of the world has had the effect of lowering tariff barriers, at least within those blocs. For example, the single market developments within the European Union (EU), the North American Free Trade Agreement (NAFTA) and the South American Trade Group (MERCOSUR) have all made it easier to trade internationally within the regions.
- Transportation infrastructures are considerably more sophisticated and cheaper than they once were. Super-efficient port operations in Rotterdam and Singapore, for example, integrated road–rail systems, jointly developed auto route systems and cheaper air freight have all reduced some of the cost barriers to international trade.
- Perhaps most significantly, far tougher world competition has forced companies to look to reducing their total costs. Given that in many industries bought-in items are the largest single part of operations costs, an obvious strategy is to source from wherever is cheapest.

There are of course problems with global sourcing. The risks of increased complexity and increased distance need managing carefully. Suppliers who are a significant distance away need to transport their products across long distances. The risks of delays and hold-ups can be far greater than when sourcing locally. Also, negotiating with suppliers whose native language is different from one's own makes communication more difficult and can lead to misunderstandings over contract terms. Therefore global sourcing decisions require businesses to balance cost, performance, service and risk factors, not all of which are obvious. These factors are important in global sourcing because of non-price or 'hidden' cost factors such as cross-border freight and handling fees, complex inventory stocking and handling requirements, and even more complex administrative, documentation and regulatory requirements. The factors that must be understood and included in evaluating global sourcing opportunities are as follows:

- *purchase price* – the total price, including transaction and other costs related to the actual product or service delivered;
- *transportation costs* – transportation and freight costs, including fuel surcharges and other costs of moving products or services from where they are produced to where they are required;
- *inventory carrying costs* – storage, handling, insurance, depreciation, obsolescence and other costs associated with maintaining inventories, including the opportunity costs of working capital (see Chapter 12);
- *cross-border taxes, tariffs and duty costs* – sometimes called 'landed costs', which are the sum of duties, shipping, insurance and other fees and taxes for door-to-door delivery;
- *supply performance* – the cost of late or out-of-specification deliveries, which, if not managed properly, can offset any price gains attained by shifting to an offshore source;
- *supply and operational risks* – including geopolitical factors, such as changes in country leadership; trade policy changes; the instability caused by war and/or terrorism or natural disasters and disease, all of which may disrupt supply.

Global sourcing and social responsibility

Although the responsibility of operations to ensure that they deal only with ethical suppliers has always been important, the expansion of global sourcing has brought the issue into sharper focus. Local suppliers can (to some extent) be monitored relatively easily. However, when suppliers are located around the world, often in countries with different traditions and ethical standards, monitoring becomes more difficult. Not only that, but there may be genuinely different views of what is regarded as ethical practice. Social, cultural and religious differences can easily make for mutual incomprehension regarding each other's ethical perspective. This is why many companies are putting significant effort into articulating and clarifying their supplier selection policies. The short case on Levi Strauss's policy is typical of an enlightened organization's approach to global sourcing.

Short case Extracts from Levi Strauss's global sourcing policy⁹



Our Global Sourcing and Operating Guidelines help us to select business partners who follow workplace standards and business practices that are consistent with our company's values. These requirements are applied to every contractor who manufactures or finishes products for Levi Strauss & Co. Trained inspectors closely audit and monitor compliance among approximately 600 cutting, sewing and finishing contractors in more than 60 countries. . . . The numerous countries where Levi Strauss & Co. has existing or future business interests present a variety of cultural, political, social and economic circumstances. . . . The Country Assessment Guidelines help us assess any issue that might present concern in light of the ethical principles we have set for ourselves. Specifically, we assess . . . the . . . Health and Safety Conditions, Human Rights Environment, the Legal System and the Political, Economic and Social Environment that would protect the company's commercial interests and brand/corporate image. The company's employment standards state that they will only do business with partners who adhere to the following guidelines:

- **Child labor.** Use of child labor is not permissible. Workers can be no less than 15 years of age and not younger than the compulsory age to be in school. We will not utilize partners who use child labor in any of their facilities.
- **Prison labor/forced labor.** We will not utilize prison or forced labor in contracting relationships in the manufacture and finishing of our products. We will not utilize or purchase materials from a business partner utilizing prison or forced labor.
- **Disciplinary practices.** We will not utilize business partners who use corporal punishment or other forms of mental or physical coercion.
- **Working hours.** While permitting flexibility in scheduling, we will identify local legal limits on work hours and seek business partners who do not exceed them except for appropriately compensated overtime. Employees should be allowed at least one day off in seven.
- **Wages and benefits.** We will only do business with partners who provide wages and benefits that comply with any applicable law and match the prevailing local manufacturing or finishing industry practices.
- **Freedom of association.** We respect workers' rights to form and join organizations of their choice and to bargain collectively. We expect our suppliers to respect the right to free association and the right to organize and bargain collectively without unlawful interference.
- **Discrimination.** While we recognize and respect cultural differences, we believe that workers should be employed on the basis of their ability to do the job rather than on the basis of personal characteristics or beliefs. We will favor business partners who share this value.



Source: Corbis/José Luis Peláez

- *Health and safety.* We will only utilize business partners who provide workers with a safe and healthy work environment. Business partners who provide residential facilities for their workers must provide safe and healthy facilities.

Questions

- 1 What do you think motivates a company like Levi Strauss to draw up a policy of this type?
- 2 What other issues would you include in such a supplier selection policy?

Physical distribution management

On the demand side of the organization, products and services need to be physically transported to customers. In the case of ‘high-visibility’ services, the service is created in the presence of the customer. Here we limit ourselves to manufacturing operations that need physically to distribute their products to customers (and implicitly to those transportation operations, such as trucking companies, whose primary concern is physical distribution). Sometimes the term **logistics**, or simply **distribution**, is used as being analogous to **physical distribution management**. Generally these terms are used to describe physical distribution management beyond the immediate customer, through to the final customer in the chain. The short case on TDG describes a company that provides these types of services as well as broader supply chain management.

Logistics

A term in supply chain management broadly analogous to physical distribution management.

Distribution

Physical distribution management

Organizing the integrated movement and storage of materials.

Back-loading

Physical distribution management and the internet

The potential offered by internet communications in physical distribution management has had two major effects. The first is to make information available more readily along the distribution chain. This means that the transport companies, warehouses, suppliers and customers which make up the chain can share knowledge of where goods are in the chain. This allows the operations within the chain to coordinate their activities more readily, with potentially significant cost savings. For example, an important issue for transportation companies is **back-loading**. When the company is contracted to transport goods from A to B, its vehicles may have to return from B to A empty. Back-loading means finding a potential customer who wants their goods transported from B to A in the right time-frame. Companies which can fill their vehicles on both the outward and return journeys will have significantly lower costs per distance travelled than those whose vehicles are empty for half the total journey.

The second impact of the internet has been in the ‘business to consumer’ (B2C, see the discussion on supply chain relationships later) part of the supply chain. While the last few years have seen an increase in the number of goods bought by consumers on-line, most goods still have to be physically transported to the customer. Often early e-retailers ran into major problems in the **order fulfilment** task of actually supplying their customers. Partly this was because many traditional warehouse and distribution operations were not designed for e-commerce fulfilment. Supplying a conventional retail operation requires relatively large vehicles to move relatively large quantities of goods from warehouses to shops. Distributing to individual customers requires a large number of smaller deliveries.

Order fulfilment

All the activities involved in supplying a customer’s order, often used in e-retailing but now also used in other types of operation.

Materials management

Materials management

The concept of **materials management** originated from purchasing functions that understood the importance of integrating materials flow and its supporting functions, both throughout the business and out to immediate customers. It includes the functions of purchasing, expediting, inventory management, stores management, production planning and control and physical distribution management. Materials management was originally seen as a means of reducing ‘total costs associated with the acquisition and management of materials’.¹⁰ Different stages in the movement of materials through a multi-echelon system are typically buffered by inventory.

Short case TDG, serving the whole supply chain¹¹

TDG is a specialist in providing *third-party* logistics services to the growing number of manufacturers and retailers which choose not to do their own distribution. Instead they outsource to companies like TDG, which has operations spread across 250 sites that cover the UK, Ireland, France, Spain, Poland and Holland, employs 8000 staff and uses 1600 vehicles. It provides European logistics services through its own operations in the Netherlands and Ireland and, with the support of alliance partners, in several other European companies.

'There are a number of different types of company providing distribution services,' says David Garman, Chief Executive Officer of TDG, *'each with different propositions for the market. At the simplest level, there are the "haulage" and "storage" businesses. These companies either move goods around or they store them in warehouses. Clients plan what has to be done and it is done to order. One level up from the haulage or storage operations are the physical distribution companies, which bring haulage and storage together. These companies collect clients' products, put them into storage facilities and deliver them to the end customer as and when required. After that there are the companies which offer contract logistics. As a contract logistics service provider you are likely to be dealing with the more sophisticated clients who are looking for better quality facilities and management and the capability to deal with more complex operations. One level further up is the market for supply chain management services. To do this you have to be able to manage supply chains from end to end, or at least some significant part of the whole chain. Doing this requires a much greater degree of analytical and modelling capability, business process reengineering and consultancy skills.'*

TDG, along with other prominent logistics companies, describes itself as a 'lead logistics provider' or LLP. This



Source: TDG plc

means it can provide the consultancy-led, analytical and strategic services integrated with a sound base of practical experience in running successful 'on-the-road' operations. *'In 1999 TDG was a UK distribution company,'* says David Garman. *'Now we are a European contract logistics provider with a vision of becoming a full supply chain management company. Providing such services requires sophisticated operations capability, especially in terms of information technology and management dynamism. Because our sites are physically dispersed with our vehicles at any time spread around the motorways of Europe, IT is fundamental to this industry. It gives you visibility of your operation. We need the best operations managers, supported by the best IT.'*

Questions

- 1 Why do you think David Garman is moving TDG towards providing more sophisticated services to clients?
- 2 What are the risks in TDG's strategy?

GO TO
WEB!



13F

Merchandising

Merchandising

A term used to describe a role in retail operations management that often combines inventory management and purchasing with organizing the layout of the shop floor.

In retail operations, the purchasing task is frequently combined with the sales and physical distribution task into a role termed **merchandising**. A merchandiser typically has responsibility for organizing sales to retail customers, for the layout of the shop floor, inventory management and purchasing. This is because retail purchase operations have to be so closely linked to daily sales to ensure that the right mix of goods is available for customers to buy at any time. For example, in food retailing, buyers specify in detail the packaging in terms of the printing process and materials, to ensure the product looks appealing when displayed in their stores. Daily trends of sales in some retail situations (typically food and fashion) can vary enormously. Replenishment of regularly stocked items has to be very quick to avoid empty shelves. Electronic point-of-sale systems help the planning and control of fast-moving consumer goods; as items are registered as sold at the till, a replenishment signal is returned to the distribution centre to deliver replacements.

Types of relationships in supply chains

From the point of view of individual operations within a supply chain, one of the key issues is how they should manage their relationships with their immediate suppliers and customers. The behaviour of the supply chain as a whole is, after all, made up of the relationships which are formed between individual pairs of operations in the chain. It is important, therefore, to have some framework which helps us to understand the different ways in which supply chain relationships can be developed.

Business or consumer relationships?

Business to business

Business to consumer

Consumer to business

Customer to customer

The growth in e-commerce has established broad categorization of supply chain relationships. This happened because internet companies have tended to focus on one of four market sectors defined by who is supplying who. Figure 13.6 illustrates this categorization and distinguishes between relationships that are the final link in the supply chain, involving the ultimate consumer, and those involving two commercial businesses. So, **business to business (B2B)** relationships are by far the most common in a supply chain context and include some of the e-procurement exchange networks discussed earlier. **Business to consumer (B2C)** relationships include both 'bricks and mortar' retailers and online retailers. Somewhat newer are the final two categories. **Consumer to business (C2B)** relationships involve consumers posting their needs on the web and stating the price they are willing to pay. Companies then decide whether to offer at that price. **Customer to customer (C2C)** relationships include the online exchange and auction services offered by some companies. In this chapter we deal almost exclusively with B2B relationships.¹²

Types of business-to-business relationship

A convenient way of categorizing supply chain relationships is to examine the extent and nature of what a company chooses to buy in from suppliers. Two dimensions are particularly important – *what* the company chooses to outsource and *who* it chooses to supply it. In terms of what is outsourced, key questions are, 'How many activities are outsourced (from

	Business	Consumer
Business	<p>B2B</p> <p><i>Relationship:</i></p> <ul style="list-style-type: none"> • Most common, all but the last link in the supply chain <p><i>E-commerce examples:</i></p> <ul style="list-style-type: none"> • EDI networks • Tesco information exchange 	<p>B2C</p> <p><i>Relationship:</i></p> <ul style="list-style-type: none"> • Retail operations • Catalogue operations, etc. <p><i>E-commerce examples:</i></p> <ul style="list-style-type: none"> • Internet retailers • Amazon.com, etc.
Consumer	<p>C2B</p> <p><i>Relationship:</i></p> <ul style="list-style-type: none"> • Consumer 'offer', business responds <p><i>E-commerce examples:</i></p> <ul style="list-style-type: none"> • Some airline ticket operators • Priceline.com, etc. 	<p>C2C</p> <p><i>Relationship:</i></p> <ul style="list-style-type: none"> • Trading, 'swap' and auction transactions <p><i>E-commerce examples:</i></p> <ul style="list-style-type: none"> • Specialist 'collector' sites • Ebay.com, etc.

Figure 13.6 The business–consumer relationship matrix¹²

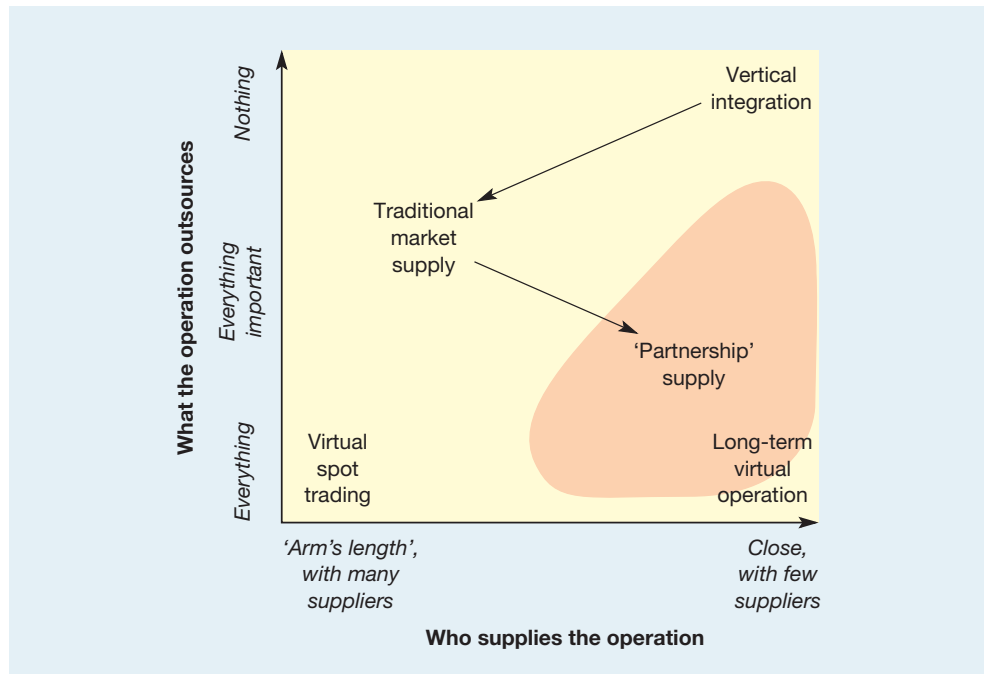


Figure 13.7 Types of supply chain relationship

doing everything in-house at one extreme to outsourcing everything at the other extreme)? and ‘How important are the activities outsourced (from outsourcing only trivial activities at one extreme to outsourcing even core activities at the other extreme)?’ In terms of who is chosen to supply products and services, again two questions are important: ‘How many suppliers will be used by the operation (from using many suppliers to perform the same set of activities at one extreme, through to only one supplier for each activity at the other extreme)?’ and ‘How close are the relationships (from ‘arm’s length’ relationships at one extreme, through to close and intimate relationships at the other extreme)?’ Figure 13.7 illustrates this way of characterizing relationships. It also identifies some of the more common types of relationship and shows some of the trends in how supply chain relationships have moved.¹³

Traditional market supply relationships

The very opposite of performing an operation in-house is to purchase goods and services from outside in a ‘pure’ market fashion, often seeking the ‘best’ supplier every time it is necessary to purchase. Each transaction effectively becomes a separate decision. The **relationship** between buyer and seller, therefore, can be very short-term. Once the goods or services are delivered and payment is made, there may be no further trading between the parties. The *advantages* of traditional market supplier relationships are usually seen as follows:

Short-term transactional relationship

- they maintain competition between alternative suppliers. This promotes a constant drive between suppliers to provide best value;
- a supplier specializing in a small number of products or services (or perhaps just one), but supplying them to many customers, can gain natural economies of scale. This enables the supplier to offer the products and services at a lower price than would be obtained if customers performed the activities themselves on a smaller scale;
- there is inherent flexibility in outsourced supplies. If demand changes, customers can simply change the number and type of suppliers. This is a far faster and simpler alternative to having to redirect their internal activities;

Short case KLM Catering Services

KLM Catering Services is the largest provider of aircraft catering and supply at Schiphol Airport near Amsterdam. Every day the company, which employs 1,200 people, prepares around 30,000 meals and 'services' 250 flights for KLM and other operators. It is now far more than just a food-preparation operation; most of its activities involve organizing all onboard services, equipment, food and drinks, newspapers, towels, earphones and so on. It also places considerable emphasis on working in unison with cleaning staff, baggage handlers and maintenance crews to ensure that the aircraft are prepared quickly for departure (fast set-ups). Normally, no more than 40 minutes are allowed for all these activities, so complete preparation and a well-ordered sequence of working is essential. These requirements for speed and total dependability would be difficult enough to achieve in a stable environment, but there is a wide range of uncertainties to be managed. Although KLM Catering Services is advised of the likely numbers of passengers for each flight (forecasts are given 11 days, 4 days and 24 hours in advance), the actual minimum number of passengers for each class is fixed only six hours before take-off (although numbers can still be increased after this, due to late sales). The agreed menus are normally fixed for six-month periods, but the actual requirements for each flight depend on the destination, the type of aircraft and the mix of passengers by ticket class. Finally, flight arrivals are sometimes delayed, putting pressure on everyone to reduce the turnaround time and upsetting work schedules.

An additional problem is that, although KLM uses standardized items (such as food trolleys, cutlery, trays and disposables), other airlines have completely different requirements. The inventory of all this equipment is moved around with the planes. Some gets damaged or lost and it can easily accumulate at a remote airport. If an aircraft



Source: Virgin Atlantic Airways

Specialized companies have developed that prepare food in specialized factories, often for several airlines

arrives without a full inventory of equipment and other items, the company is obliged to fill the gaps from its local inventory, which amounts to over 15,000 different items.

Questions

- 1 Why would an airline use KLM Catering Services rather than organize its own onboard services?
- 2 What are the main operations objectives that KLM Catering Services must achieve in order to satisfy its customers?
- 3 Why is it important for airlines to reduce turnaround time when an aircraft lands?

- innovations can be exploited no matter where they originate. Specialist suppliers are more likely to come up with innovative products and services which can be bought in faster and cheaper than would be the case if the company were itself trying to innovate;
- they help operations to concentrate on their core activities. One business cannot be good at everything. It is sensible therefore to concentrate on the important activities and out-source the rest.

There are, however, *disadvantages* in buying in a totally 'free market' manner:

- there may be supply uncertainties. Once an order has been placed, it is difficult to maintain control over how that order is fulfilled;
- choosing who to buy from takes time and effort. Gathering sufficient information and making decisions continually are, in themselves, activities which need to be resourced;
- there are strategic risks in subcontracting activities to other businesses. An over-reliance on outsourcing can 'hollow out' the company, leaving it with no internal capabilities which it can exploit in its markets.

Short-term relationships may be used on a trial basis when new companies are being considered as more regular suppliers. Also, many purchases which are made by operations are one-off or very irregular. For example, the replacement of all the windows in a company's office block would typically involve this type of competitive-tendering market relationship. In some public-sector operations, purchasing is still based on short-term contracts. This is mainly because of the need to prove that public money is being spent as judiciously as possible. However, this short-term, price-oriented type of relationship can have a downside in terms of ongoing support and reliability. This may mean that a short-term 'least-cost' purchase decision will lead to long-term high cost.

Virtual operations

Virtual operation

An operation that performs few, if any, value-adding activities itself, rather it organizes a network of supplier operations, seen as the ultimate in outsourcing.

An extreme form of outsourcing operational activities is that of the **virtual operation**. Virtual operations do relatively little themselves, but rely on a network of suppliers who can provide products and services on demand. A network may be formed for only one project and then disbanded once that project ends. For example, some software and internet companies are virtual in the sense that they buy in all the services needed for a particular development. This may include not only the specific software development skills but also such things as project management, testing, applications prototyping, marketing, physical production and so on. Much of the Hollywood film industry operates in this way. A production company may buy and develop an idea for a movie, but it is created, edited and distributed by a loose network of agents, actors, technicians, studios and distribution companies.

The advantage of virtual operations is their flexibility and the fact that the risks of investing in production facilities are far lower than in a conventional operation. However, without any solid base of resources, a company may find it difficult to hold on to and develop a unique core of technical expertise. The resources used by virtual companies will almost certainly be available to competitors. In effect, the core competence of a virtual operation can lie only in the way it is able to manage its supply network.

'Partnership' supply relationships

Partnership relationships

A type of relationship in supply chains that encourages relatively enduring cooperative agreements for the joint accomplishment of business goals.

Partnership relationships in supply chains are sometimes seen as a compromise between vertical integration on the one hand (owning the resources which supply you) and pure market relationships on the other (having only a transactional relationship with those who supply you). Although to some extent this is true, partnership relationships are not only a simple mixture of vertical integration and market trading, although they do attempt to achieve some of the closeness and coordination efficiencies of vertical integration, while at the same time attempting to achieve a relationship that has a constant incentive to improve. Partnership relationships are defined as '*... relatively enduring inter-firm cooperative agreements, involving flows and linkages that use resources and/or governance structures from autonomous organizations, for the joint accomplishment of individual goals linked to the corporate mission of each sponsoring firm*'.¹⁴ What this means is that suppliers and customers are expected to cooperate, even to the extent of sharing skills and resources, to achieve joint benefits beyond those they could have achieved by acting alone.

At the heart of the concept of partnership lies the issue of the closeness of the relationship. Partnerships are close relationships, the degree of which is influenced by a number of factors, as follows:

- *Sharing success.* An attitude of shared success means that both partners work together in order to increase the total amount of joint benefit they receive rather than manoeuvring to maximize their own individual contribution.
- *Long-term expectations.* Partnership relationships imply relatively long-term commitments, but not necessarily permanent ones.
- *Multiple points of contact.* Communication between partners is not only through formal channels but may take place between many individuals in both organizations.

- *Joint learning.* Partners in a relationship are committed to learn from each other's experience and perceptions of the other operations in the chain.
- *Few relationships.* Although partnership relationships do not necessarily imply single sourcing by customers, they do imply a commitment on the part of both parties to limit the number of customers or suppliers with which they do business. It is difficult to maintain close relationships with many different trading partners.
- *Joint coordination of activities.* Because there are fewer relationships, it becomes possible jointly to coordinate activities such as the flow of materials or service, payment and so on.
- *Information transparency.* An open and efficient information exchange is seen as a key element in partnerships because it helps to build confidence between the partners.
- *Joint problem solving.* Although partnerships do not always run smoothly, jointly approaching problems can increase closeness over time.
- *Trust.* This is probably the key element in partnership relationships. In this context, trust means the willingness of one party to relate to the other on the understanding that the relationship will be beneficial to both, even though that cannot be guaranteed. Trust is widely held to be both the key issue in successful partnerships and also, by far, the most difficult element to develop and maintain.

Customer relationship management (CRM)

There is a story (which may or may not be true) that is often quoted to demonstrate the importance of using information technology to analyze customer information. It goes like this. Wal-Mart, the huge US-based supermarket chain, did an analysis of customers' buying habits and found a statistically significant correlation between purchases of beer and purchases of diapers (nappies), especially on Friday evenings. The reason? Fathers were going to the supermarket to buy nappies for their babies and because fatherhood restricted their ability to go out for a drink as often, they would also buy beer. Supposedly this led the supermarket to start locating nappies next to the beer in their stores, resulting in increased sales of both.

Whether it is true or not, it does illustrate the potential of analyzing data to understand customers. This is the basis of **customer relationship management (CRM)**. It is a method of learning more about customers' needs and behaviours in order to develop stronger relationships with them. Although CRM usually depends on information technology, it is misleading to see it as a 'technology'. Rather it is a process that helps to understand customers' needs and develop ways of meeting those needs while maximizing profitability. CRM brings together all the disparate information about customers so as to gain insight into their behaviour and their value to the business. It helps to sell products and services more effectively and increase revenues by:

- providing services and products that are exactly what your customers want;
- retaining existing customers and discovering new ones;
- offering better customer service;
- cross selling products more effectively.

CRM tries to help organizations understand who their customers are and what their value is over a lifetime. It does this by building a number of steps into its customer interface processes. First, the business must determine the needs of its customers and how best to meet those needs. For example, a bank may keep track of its customers' age and lifestyle so that it can offer appropriate products like mortgages or pensions to them when they fit their needs. Second, the business must examine all the different ways and parts of the organization where customer-related information is collected, stored and used. Businesses may interact with customers in different ways and through different people. For example, sales people, call centres, technical staff, operations and distribution managers may all, at different times, have contact with customers. CRM systems should integrate this data. Third, all customer-related data must be analyzed to obtain a holistic view of each customer and identify where service can be improved.

Critical commentary

Despite its name, some critics of CRM argue that the greatest shortcoming is that it is insufficiently concerned with directly helping customers. CRM systems are sold to executives as a way to increase efficiency, force standardized processes and gain better insight into the state of the business. But they rarely address the need to help organizations resolve customer problems, answer customer questions faster or help them solve their own problems. This may explain the trend towards a shift in focus from automating internal front-office functions to streamlining processes such as on-line customer support.

Supply chain behaviour

A fundamental question in supply chain management is: 'How should supply chains be managed when operations compete in different ways in different markets?' One answer, proposed by Professor Marshall Fisher of Wharton Business School, is to organize the supply chains serving those individual markets in different ways.¹⁵ He points out that many companies have seemingly similar products which, in fact, compete in different ways. Shoe manufacturers may produce classics which change little over the years, as well as fashions which last only one or two seasons. Chocolate manufacturers have stable lines which have been sold for 50 years, but also produce 'specials' associated with an event or film release, maybe selling only for a few months. Demand for the former products will be relatively stable and predictable, but demand for the latter will be far more uncertain. Also, the profit margin commanded by the innovative product will probably be higher than that of the more functional product. However, the price (and therefore the margin) of the innovative product may drop rapidly once it has become unfashionable in the market.

Efficient supply chain

Responsive supply chain

The supply chain policies which are seen to be appropriate for functional products and innovative products are termed by Fisher **efficient supply chain** policies and **responsive supply chain** policies, respectively. Efficient supply chain policies include keeping inventories low, especially in the downstream parts of the network, so as to maintain fast throughput and reduce the amount of working capital tied up in the inventory. What inventory there is in the network is concentrated mainly in the manufacturing operation, where it can keep utilization high and therefore manufacturing costs low. Information must flow quickly up and down the chain from retail outlets back up to the manufacturer so that schedules can be given the maximum amount of time to adjust efficiently. The chain is then managed to make sure that products flow as quickly as possible down the chain to replenish what few stocks are kept downstream. By contrast, responsive supply chain policy stresses high service levels and responsive supply to the end customer. The inventory in the network will be deployed as closely as possible to the customer. In this way, the chain can still supply even when dramatic changes occur in customer demand. Fast throughput from the upstream parts of the chain will still be needed to replenish downstream stocks. But those downstream stocks are needed to ensure high levels of availability to end customers. Figure 13.8 illustrates how the different supply chain policies match the different market requirements implied by functional and innovative products.

Supply chain dynamics

It was demonstrated in the 1960s by Jay Forrester¹⁶ that certain dynamics exist between firms in supply chains that cause errors, inaccuracies and volatility, and that these increase for operations further upstream in the supply chain. This effect is now known as the

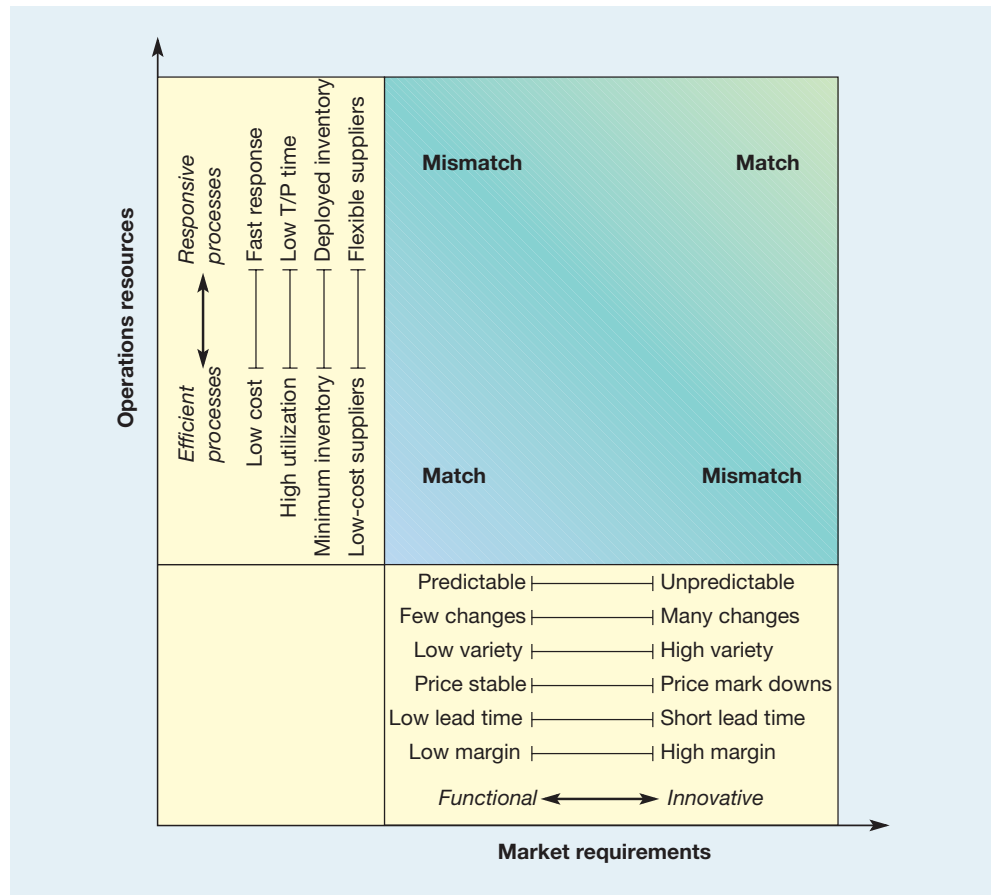


Figure 13.8 Matching the operations resources in the supply chain with market requirements

Source: Adapted from Fisher, M.L. (1997) 'What Is the Right Supply Chain for Your Product?', *Harvard Business Review*, March–April, pp. 105–16. Copyright © 1997 by Harvard Business School Publishing Corporation; all rights reserved. Reproduced with permission.

The bullwhip effect

The tendency of supply chains to amplify relatively small changes at the demand side of a supply chain such that the disruption at the supply end of the chain is much greater.

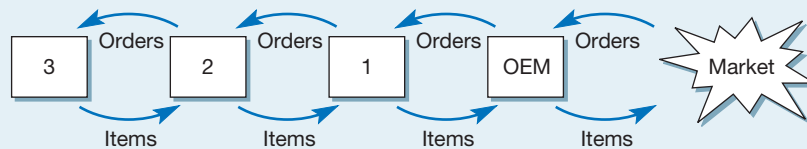
'bullwhip effect', because a small disturbance at one end of the chain causes increasingly large disturbances as it works its way towards the end. Its main cause is an understandable desire by the different links in the supply chain to manage their production rates and inventory levels sensibly.¹⁷

To demonstrate this, examine the production rate and stock levels for the supply chain shown in Table 13.4. This is a four-stage supply chain where an original equipment manufacturer (OEM) is served by three tiers of suppliers. The demand from the OEM's market has been running at a rate of 100 items per period, but in period 2 demand reduces to 95 items. All stages in the supply chain work on the principle that they will keep in stock one period's demand (a simplification but not a gross one). The 'stock' column shows the starting stock at the beginning and the finish stock at the end of the period. At the beginning of period 2, the OEM has 100 units in stock. Demand in period 2 is 95 and the OEM must produce enough to finish up at the end of the period with 95 in stock (this being the new demand rate). To do this, it need only manufacture 90 items; these, together with five items taken out of the starting stock, will supply demand and leave a finished stock of 95 items and the OEM can operate at a steady rate of 95 items per period. Note, however, that a change in demand of only five items has produced a fluctuation of ten items in the OEM's production rate.

Now carry this same logic through to the first-tier supplier. At the beginning of period 2, the second-tier supplier has 100 items in stock. The demand which it has to supply in period 2 is derived from the production rate of the OEM. This has dropped to 90 in period 2. The first-tier supplier therefore has to produce sufficient to supply the demand of 90 and leave

Table 13.4 Fluctuations of production levels along supply chain in response to a small change in end customer demand

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	60	100 80	80	100 90	90	100 95	95
3	180	60 120	120	80 100	100	90 95	95	95 95	95
4	60	120 90	90	100 95	95	95 95	95	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



(Note: all operations keep one period's inventory)

one month's demand (now 90 items) as its finish stock. A production rate of 80 items per month will achieve this. It will therefore start period 3 with an opening stock of 90 items, but the demand from the OEM has now risen to 95 items. It therefore has to produce sufficient to fulfil this demand of 95 items and leave 95 items in stock. To do this, it must produce 100 items in period 3. This logic can be extended right back to the third-tier supplier. The further back up the supply chain an operation is placed, the more drastic are the fluctuations caused by the relatively small change in demand from the final customer. The decision of how much to produce each month was governed by the following relationship:

$$\text{Total available for sale in any period} = \text{total required in the same period}$$

$$\text{Starting stock} + \text{production rate} = \text{demand} + \text{closing stock}$$

$$\text{Starting stock} + \text{production rate} = 2 \times \text{demand} \quad (\text{because closing stock must be equal to demand})$$

$$\text{Production rate} = 2 \times \text{demand} - \text{starting stock}$$

This relatively simple exercise does not include any time lag between a demand occurring in one part of the supply chain and it being transmitted to its supplier. In practice there will be such a lag and this will make the fluctuations even more marked.

Miscommunication in the supply chain



Whenever two operations in a supply chain arrange for one to provide products or services to the other, there is the potential for misunderstanding and miscommunication. This may be caused simply by not being sufficiently clear about what a customer expects or what a supplier is capable of delivering. There may also be more subtle reasons stemming from differences in perception of seemingly clear agreements. The effect is analogous to the

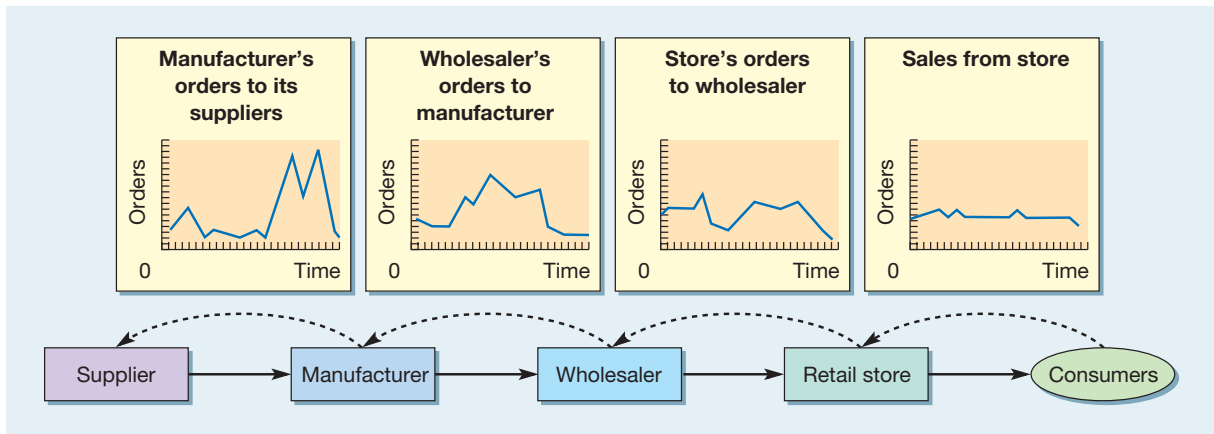


Figure 13.9 Typical supply chain dynamics

children's game of 'Chinese whispers'. The first child whispers a message to the next child who, whether he or she has heard it clearly or not, whispers an interpretation to the next child and so on. The more children the message passes between, the more distorted it tends to become. The last child says out loud what the message is and the children are amused by the distortion of the original message. Figure 13.9 shows the bullwhip effect in a typical supply chain, with relatively small fluctuations in the market causing increasing volatility further back in the chain.

Supply chain improvement

An important aspect of supply chain management is the attempts to improve supply chain performance. Most of these are concerned with coordinating the activities of the operations in the chain¹⁷ and this has been significantly helped by the development of e-business, some of the effects of which have already been described but are worth summarizing.

Some effects of e-business on supply chain management practice¹⁸

New information technology applications combined with internet-based e-business have transformed the supply chain management practice. Largely, this is because they provide better and faster information to all stages in the supply chain. Information is the life blood of supply chain management. Without appropriate information, supply chain managers cannot make the decisions that coordinate activities and flows through the chain. Without appropriate information, each stage in the supply chain has relatively few cues to tell them what is happening elsewhere in the chain. To some extent, they are 'driving blind' and having to rely on the most obvious of mismatches between the activities of different stages in the chain (such as excess inventory) to inform their decisions. Conversely, with accurate and 'near real-time' information, the disparate elements in supply chains can integrate their efforts to the benefit of the whole chain and, eventually, the end customer. Just as importantly, the collection, analysis and distribution of information using e-business technologies is far less expensive to arrange than previous, less automated methods. Table 13.5 summarizes some of the effects of e-business on three important aspects of supply chain management – business and market information flow, product and service flow, and the cash flow that comes as a result of product and service flow.

Information-sharing

One of the reasons for the fluctuations in output described in the example earlier was that each operation in the chain reacted to the orders placed by its immediate customer. None of the operations had an overview of what was happening throughout the chain. If information

Table 13.5 Some effects of e-business on supply chain management practice

	<i>Market/sales information flow</i>	<i>Product/service flow</i>	<i>Cash flow</i>
Supply chain-related activities	Understanding customers' needs Designing appropriate products/services Demand forecasting	Purchasing Inventory management Throughput/waiting times Distribution	Supplier payments Customer invoicing Customer receipts
Beneficial effects of e-business practices	Better customer relationship management Monitoring real-time demand On-line customization Ability to coordinate output with demand	Lower purchasing administration costs Better purchasing deals Reduced bullwhip effect Reduced inventory More efficient distribution	Faster movement of cash Automated cash movement Integration of financial information with sales and operations activities

Information sharing helps improve supply chain performance

had been available and **shared throughout the chain**, it is unlikely that such wild fluctuations would have occurred. It is sensible therefore to try to transmit information throughout the chain so that all the operations can monitor true demand, free of these distortions. An obvious improvement is to make information on end customer demand available to upstream operations. Electronic point-of-sale (EPOS) systems used by many retailers attempt to do this. Sales data from checkouts or cash registers are consolidated and transmitted to the warehouses, transportation companies and supplier manufacturing operations that form the supply chain. Similarly, electronic data interchange helps to share information (see the short case on Seven-Eleven Japan). EDI can also affect the economic order quantities shipped between operations in the supply chain.

Short case **Seven-Eleven Japan's agile supply chain**¹⁹

Seven-Eleven Japan (SEJ) is the country's largest and most successful retailer, with higher sales per square metre or per store than any of its competitors. Perhaps most significantly, the average amount of stock in an SEJ store is between 7 and 8.4 days of demand. This is a remarkably fast stock turnover for any retailer. Industry analysts see SEJ's agile supply chain management as being the driving force behind its success. And this agility is supported by a fully integrated information system that provides visibility of the whole supply chain and ensures fast replenishment of goods in its stores customized exactly to the needs of individual stores. This is shown in Figure 13.10.

As a customer comes to the checkout counter the assistant keys in the customer's gender and approximate age and then scans the bar codes of the purchased goods. This sales data is transmitted to the Seven-Eleven headquarters through its own high-speed lines.

Simultaneously, the store's own computer system records and analyzes the information so that store managers and headquarters have immediate point-of-sale information.



Source: Masatoshi Ichimura

This allows both store managers and headquarters to analyze, hour by hour, sales trends, any stock-outs, types of customer buying certain products and so on. The

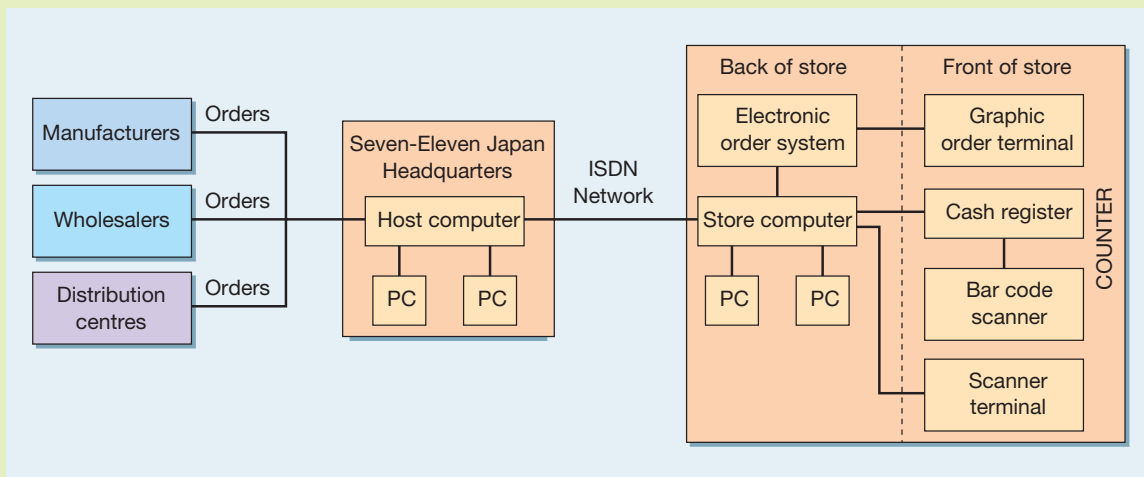


Figure 13.10 Seven-Eleven Japan's information system

headquarters' computer aggregates all this data by region, product and time so that all parts of the supply chain, from suppliers through to the stores, have the information by the next morning. Every Monday, the company chairman and top executives review all performance information for the previous week and develop plans for the up-coming week. These plans are presented on Tuesday morning to SEJ's 'operations field counsellors', each of whom is responsible for facilitating performance improvement in around eight stores. On Tuesday afternoon the field counsellors for each region meet to decide how they will implement the overall plans for their region. On Tuesday night the counsellors fly back to their regions and by next morning are visiting their stores to deliver the messages developed at headquarters which will help the stores implement their plans.

SEJ's physical distribution is also organized on an agile basis. The distribution company maintains radio communications with all drivers and SEJ's headquarters keeps track of all delivery activities. Delivery times and routes are planned in great detail and published in the form of a delivery timetable. On average each delivery takes

only 90 seconds at each store and drivers are expected to make their deliveries within ten minutes of scheduled time. If a delivery is late by more than 30 minutes, the distribution company has to pay the store a fine equivalent to the gross profit on the goods being delivered. The agility of the whole supply system also allows SEJ headquarters and the distribution company to respond to disruptions. For example, on the day of the Kobe earthquake, SEJ used 7 helicopters and 125 motor cycles to rush through a delivery of 64,000 rice balls to earthquake victims.

Questions

- 1 SEJ stores typically carry around 3000 SKUs (stock-keeping units, that is types of different product) compared with a large supermarket which may have over 100,000 SKUs. How do you think this affects their ability to manage the supply chain in an agile manner?
- 2 SEJ places a lot of emphasis on the use of its information system to achieve agility. How do you think the way in which an information system is used affects its value to a supply chain?

Channel alignment

Channel alignment helps improve supply chain performance

Channel alignment means the adjustment of scheduling, material movements, stock levels, pricing and other sales strategies so as to bring all the operations in the chain into line with each other. This goes beyond the provision of information. It means that the systems and methods of planning and control decision making are harmonized through the chain. For example, even when using the same information, differences in forecasting methods or purchasing practices can lead to fluctuations in orders between operations in the chain. One way of avoiding this is to allow an upstream supplier to manage the inventories of its downstream customer. This is known as **vendor-managed inventory (VMI)**. So, for example, a packaging supplier could take responsibility for the stocks of packaging materials held by a food manufacturing customer. In turn, the food manufacturer takes responsibility for the stocks of its products which are held in its customer's, the supermarket's, warehouses.

Vendor-managed inventory

Operational efficiency

Operational efficiency helps improve supply chain performance

‘Operational efficiency’ means the efforts that each operation in the chain can make to reduce its own complexity, reduce the cost of doing business with other operations in the chain and reduce throughput time. The cumulative effect of these individual activities is to simplify throughput in the whole **chain**. For example, imagine a chain of operations whose performance level is relatively poor: quality defects are frequent, the lead time to order products and services is long, and delivery is unreliable and so on. The behaviour of the chain would be a continual sequence of errors and effort wasted in replanning to compensate for the errors. Poor quality would mean extra and unplanned orders being placed and unreliable delivery and slow delivery lead times would mean high safety stocks. Just as important, most operations managers’ time would be spent coping with the inefficiency. By contrast, 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.

Supply chain time compression

One of the most important approaches to improving the operational efficiency of supply chains is known as **time compression**. This means speeding up the flow of materials down the chain and the flow of information back up the chain. The supply chain dynamics effect we observed in Table 13.4 was due partly to the slowness of information moving back up the chain. Figure 13.11 illustrates the advantages of supply chain time compression in terms of its overall impact on profitability.²⁰

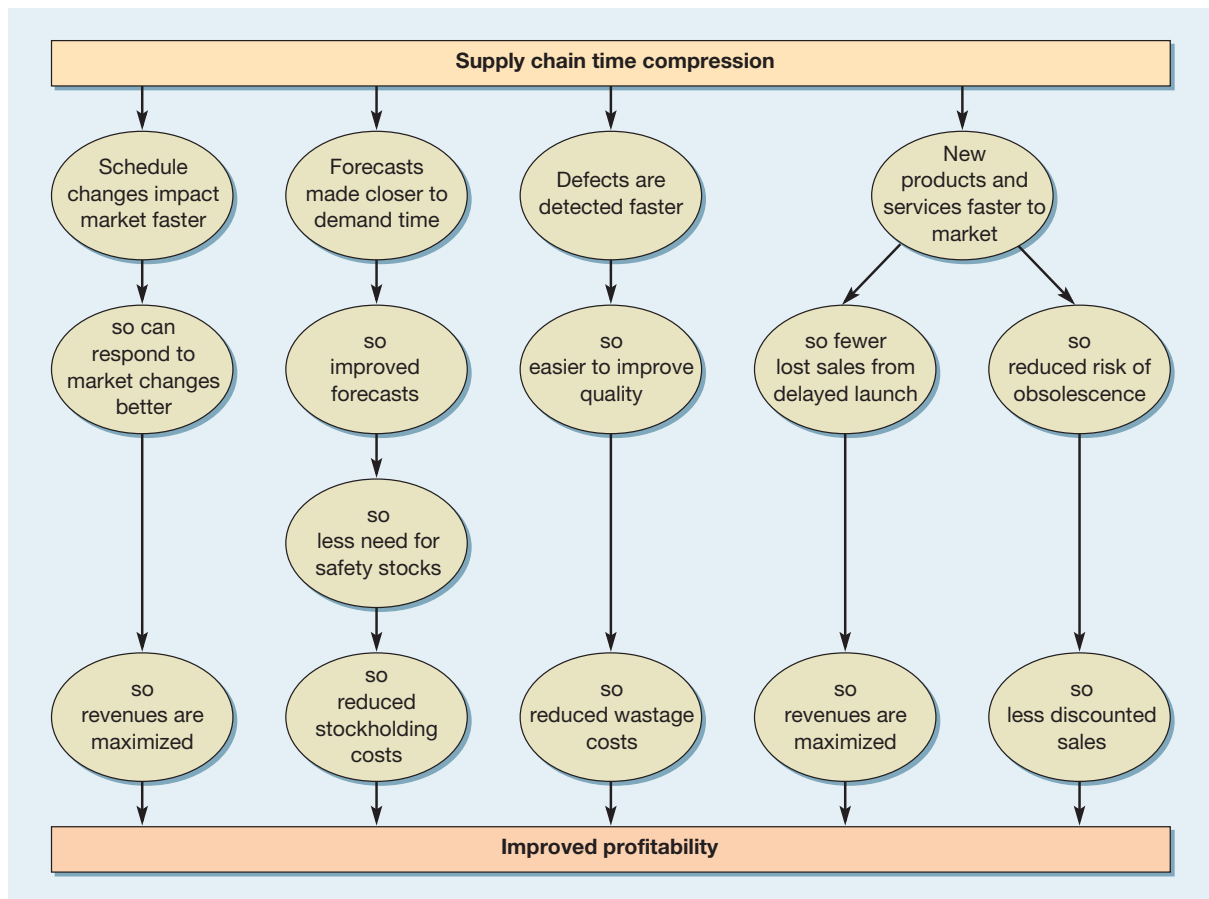


Figure 13.11 Supply chain time compression can both reduce costs and increase revenues

Source: Based on Towill²⁰

Supply chain risk

A study of the vulnerability of supply chains to disruption.

Supply chain vulnerability

One of the consequences of the agile supply chain concept has been to take more seriously the possibility of **supply chain risk** and disruption. The concept of agility includes consideration of how supply chains have to cope with common disruptions such as late deliveries, quality problems, incorrect information and so on. Yet far more dramatic events can disrupt supply chains. For example, Land Rover (a division of the Ford Motor Company) had subcontracted the manufacture of its Discovery chassis to a single supplier that had become insolvent and was now in the hands of the receivers. The receivers were demanding an up-front payment of around £60 million to continue supply, arguing that they were legally obliged to recover as much money as possible on behalf of creditors. The outsourcing of a component had made the supply chain more vulnerable, but there are also other factors which had increased the vulnerability of supply. Global sourcing means that parts are shipped around the world on their journey through the supply chain. Micro chips manufactured in Taiwan could be assembled to printed circuit boards in Shanghai which are then finally assembled into a computer in Ireland. Perhaps most significantly there tends to be far less inventory in supply chains that could buffer interruptions to supply. According to Professor Martin Christopher, an authority on supply chain management: *‘Potentially the risk of disruption has increased dramatically as the result of a too-narrow focus on supply chain efficiency at the expense of effectiveness. Unless management recognizes the challenge and acts upon it, the implications for us all could be chilling.’*²¹

These ‘chilling’ effects can arise as a result of disruptions such as natural disasters, terrorist incidents, industrial or direct action such as strikes and protests, accidents such as fire in a vital component supplier’s plant and so on. Of course, many of these disruptions have always been present in business. It is the increased vulnerability of supply chains that has made many companies place more emphasis on understanding supply chain risks.

Summary answers to key questions

The Companion Website to the book – www.pearsoned.co.uk/slack – also has a brief ‘Study Guide’ to each chapter.

What is supply chain management and its related activities?

- Supply chain management is a broad concept which includes the management of the entire supply chain from the supplier of raw material to the end customer.
- Its component activities include purchasing, physical distribution management, logistics, materials management and customer relationship management (CRM).

How can the relationship between operations in a supply chain affect the way it works?

- Supply networks are made up of individual pairs of buyer–supplier relationships. The use of internet technology in these relationships has led to a categorization based on a distinction between business and consumer partners. Business to business (B2B) relationships are of the most interest in operations management terms. They can be characterized on two dimensions – what is outsourced to a supplier, and the number and closeness of the relationships.
- Traditional market supplier relationships are where a purchaser chooses suppliers on an individual periodic basis. No long-term relationship is usually implied by such ‘transactional’ relationships, but it makes it difficult to build internal capabilities.
- Virtual operations are an extreme form of outsourcing where an operation does relatively little itself and sub-contracts almost all its activities.

- Partnership supplier relationships involve customers forming long-term relationships with suppliers. In return for the stability of demand, suppliers are expected to commit to high levels of service. True partnerships are difficult to sustain and rely heavily on the degree of trust which is allowed to build up between partners.

Are different supply chain objectives needed in different circumstances?

- Marshall Fisher distinguishes between functional markets and innovative markets. He argues that functional markets, which are relatively predictable, require efficient supply chains, whereas innovative markets, which are less predictable, require 'responsive' supply chains.

How do supply chains behave in practice?

- Supply chains exhibit a dynamic behaviour known as the 'bullwhip' effect. This shows how small changes at the demand end of a supply chain are progressively amplified for operations further back in the chain.
- To reduce the 'bullwhip' effect, operations can adopt some mixture of three coordination strategies:
 - information-sharing: the efficient distribution of information throughout the chain can reduce demand fluctuations along the chain by linking all operations to the source of demand;
 - channel alignment: this means adopting the same or similar decision-making processes throughout the chain to coordinate how and when decisions are made;
 - operational efficiency: this means eliminating sources of inefficiency or ineffectiveness in the chain; of particular importance is 'time compression', which attempts to increase the throughput speed of the operations in the chain.
- Increasingly, supply risks are being managed as a countermeasure to their vulnerability.

Case study

Supplying fast fashion²²



Garment retailing has changed. No longer is there a standard look that all retailers adhere to for a whole season. Fashion is fast, complex and furious. Different trends overlap and fashion ideas that are not even on a store's radar screen can become 'must haves' within six months. Many retail businesses with their own brands such as H&M and Zara sell up-to-the-minute fashionability at low prices, in stores that are clearly focused on one particular market. In the world of fast fashion catwalk designs speed their way into high-street stores at prices anyone can afford. The quality of the garment means that it may last only one season, but fast fashion customers don't want yesterday's trends. As *Newsweek* puts it, '... being a 'quicker picker-upper' is what made fashion retailers H&M and Zara successful. [They] thrive by practising the new science of "fast fashion"; compressing product development cycles as much as six times.' But the retail operations that customers see are only the end part of the supply chains that feeds them. And these have also changed.

At its simplest level, the fast fashion supply chain has four stages. First, the garments are designed, after which they are manufactured before being distributed to the retail outlets where they are displayed and sold in retail operations designed to reflect the business's brand values. In this short case we examine two fast fashion operations, Hennes and Mauritz (known as H&M) and Zara, together with United Colours of Benetton (UCB), a similar chain but with a different market positioning.

Benetton

Almost 50 years ago Luciano Benetton took the world of fashion by storm by selling the bright, casual sweaters designed by his sister across Europe (and later the rest of the world), promoted by controversial advertising. By 2005 the Benetton Group was present in 120 countries throughout the world. Selling casual garments, mainly under its United Colours of Benetton (UCB) and its more fashion-orientated Sisley brands, it produces 110 million



Source: Empics

garments a year, over 90 per cent of them in Europe. Its retail network of over 5000 stores produces revenue of around €2 billion. Benetton products are seen as less ‘high fashion’ but of higher quality and durability, with higher prices, than H&M and Zara.

H&M

Established in Sweden in 1947, it sells clothes and cosmetics in over 1000 stores in 20 countries around the world. The business concept is ‘fashion and quality at the best price’. With more than 40,000 employees and revenues of around SEK 60,000 million, its biggest market is Germany, followed by Sweden and the UK. H&M is seen by many as the originator of the fast fashion concept. Certainly it has years of experience at driving down the price of up-to-the-minute fashions. *‘We ensure the best price,’ they say, ‘by having few middlemen, buying large volumes, having extensive experience of the clothing industry, having a great knowledge of which goods should be bought from which markets, having efficient distribution systems and being cost-conscious at every stage.’*

Zara

The first store opened almost by accident in 1975 when Amancio Ortega Gaona, a women’s pyjama manufacturer, was left with a large cancelled order. The shop he opened was intended only as an outlet for cancelled orders. Now Inditex, the holding group that includes the Zara brand, has

over 1300 stores in 39 countries with annual sales of over €3 billion. The Zara brand accounts for over 75 per cent of the group’s total retail sales and is still based in north-west Spain. By 2003 it had become the world’s fastest growing volume garment retailer. The Inditex group also has several other branded chains including Pull and Bear, and Massimo Dutti. In total it employs almost 40,000 people in a business that is known for a high degree of vertical integration compared with most fast fashion companies. The company believes it is its integration along the supply chain that allows it to respond to customer demand fast and flexibly while keeping stock to a minimum.

Design

All three businesses emphasize the importance of design in this market. Although not *haute couture*, capturing design trends is vital to success. Even the boundary between high and fast fashion is starting to blur. In 2004 H&M recruited high fashion designer Karl Lagerfeld, previously noted for his work with more exclusive brands. For H&M his designs were priced for value rather than exclusivity. *‘Why do I work for H&M? Because I believe in inexpensive clothes, not “cheap” clothes,’* said Lagerfeld. Yet most of H&M’s products come from over 100 designers in Stockholm who work with a team of 50 pattern designers, around 100 buyers and a number of budget controllers. The department’s task is to find the optimum balance between the three components comprising H&M’s business concept – fashion, price and quality. Buying volumes and delivery dates are then decided.

Zara’s design functions are organized in a different way to most similar companies. Conventionally, the design input comes from three *separate* functions: the designers themselves, market specialists and buyers who place orders on to suppliers. At Zara the design stage is split into three product areas: women’s, men’s and children’s garments. In each area, designers, market specialists and buyers are co-located in design halls that also contain small workshops for trying out prototype designs. The market specialists in all three design halls are in regular contact with Zara retail stores, discussing customer reaction to new designs. In this way, the retail stores are not the end of the whole supply chain but the beginning of the design stage of the chain. Zara’s 300 or so designers, whose average age is 26, produce approximately 40,000 items per year, of which about 10,000 go into production.

Benetton also has around 300 designers, who not only design for all the company’s brands but also are engaged in researching new materials and clothing concepts. Since 2000 the company has moved to standardize its range globally. At one time more than 20 per cent of its ranges were customized to the specific needs of each country, now only 5–10 per cent of garments are customized. This reduced the number of individual designs offered globally by over 30 per cent, strengthening the global brand image and reducing production costs.



Both H&M and Zara have moved away from the traditional industry practice of offering two 'collections' a year, for spring/summer and autumn/winter. Their 'seasonless cycle' involves the continual introduction of new products on a rolling basis throughout the year. This allows designers to learn from customers' reactions to their new products and incorporate them quickly into more new products. The most extreme version of this idea is practised by Zara. A garment will be designed, a batch manufactured and 'pulsed' through the supply chain. Often the design is never repeated; it may be modified and another batch produced, but there are no 'continuing' designs as such. Even Benetton has increased the proportion of what it calls 'flash' collections, small collections that are put into its stores during the season.

Manufacturing

At one time Benetton focused its production on its Italian plants. Then it significantly increased its production outside Italy to take advantage of lower labour costs. Non-Italian operations include factories in North Africa, Eastern Europe and Asia. Yet each location operates in a very similar manner. A central, Benetton-owned operation performs some manufacturing operations (especially those requiring expensive technology) and coordinates the more labour-intensive production activities that are performed by a network of smaller contractors (often owned and managed by ex-Benetton employees). These contractors may in turn sub-contract some of their activities. The company's central facility in Italy allocates production to each of the non-Italian networks, deciding what and how much each is to produce. There is some specialization; for example, jackets are made in Eastern Europe while T-shirts are made in Spain. Benetton also has a controlling share in its main supplier of raw materials, to ensure fast supply to its factories. Benetton is also known for the practice of dyeing garments after assembly rather than using dyed thread or fabric. This postpones decisions about colours until late in the supply process so that there is a greater chance of producing what is needed by the market.

H&M does not have any factories of its own, but instead works with around 750 suppliers. Around half of production takes place in Europe and the rest mainly in Asia. It has 21 production offices around the world that between them are responsible for coordinating the suppliers who produce over half a billion items a year for H&M. The relationship between production offices and suppliers is vital because it allows fabrics to be bought in early. The actual dyeing and cutting of the garments can then be decided at a later stage in the production. The later an order can be placed on suppliers, the less the risk of buying the wrong thing. Average supply lead times vary from three weeks up to six months, depending on the nature of the goods. However, *'the most important thing,'* they say, *'is to find the optimal time to order each item.'*

Short lead times are not always best. With some high-volume fashion basics, it is to our advantage to place orders far in advance. Trendier garments require considerably shorter lead times.'

Zara's lead times are said to be the fastest in the industry, with a 'catwalk to rack' time in as little of as 15 days. According to one analyst this is because it *'owned most of the manufacturing capability used to make its products, which it uses as a means of exciting and stimulating customer demand'*. About half of Zara's products are produced in its network of 20 Spanish factories, which, as at Benetton, tended to concentrate on the more capital-intensive operations such as cutting and dyeing. Sub-contractors are used for most labour-intensive operations like sewing. Zara buys around 40 per cent of its fabric from its own wholly-owned subsidiary, most of which is in undyed form for dyeing after assembly. Most Zara factories and their sub-contractors work on a single-shift system to retain some volume flexibility.

Distribution

Both Benetton and Zara have invested in highly automated warehouses, close to their main production centres that store, pack and assemble individual orders for their retail networks. These automated warehouses represent a major investment for both companies. In 2001, Zara caused some press comment by announcing that it would open a second automated warehouse even though, by its own calculations, it was using only about half its existing warehouse capacity. More recently, Benetton caused some controversy by announcing that it was exploring the use of RFID tags to track its garments.

At H&M, while the stock management is primarily handled internally, physical distribution is sub-contracted. A large part of the flow of goods is routed from production site to the retail country via H&M's transit terminal in Hamburg. Upon arrival the goods are inspected and allocated to the stores or to the centralized store stock room. The centralized store stock room, referred to within H&M as 'call-off warehouse', replenishes stores on item level according to what is selling.

Retail

All H&M stores (average size 1300 square metres) are owned and run solely by H&M. The aim is to *'create a comfortable and inspiring atmosphere in the store that makes it simple for customers to find what they want and to feel at home'*. This is similar to Zara stores, although they tend to be smaller (average size 800 square metres). Perhaps the most remarkable characteristic of Zara stores is that garments rarely stay in the store for longer than two weeks. Because product designs are often not repeated and are produced in relatively small batches, the range of garments displayed in the store can change radically every two or three weeks. This encourages customers both to avoid delaying a purchase and to revisit the store frequently.

Since 2000 Benetton has been reshaping its retail operations. At one time the vast majority of Benetton retail outlets were small shops run by third parties. Now these small stores have been joined by several, Benetton-owned and operated, larger stores (1500 to 3000 square metres). These mega-stores can display the whole range

of Benetton products and reinforce the Benetton shopping experience.

Question

- 1 Compare and contrast the approaches taken by H&M, Benetton and Zara to managing their supply chain.



Other short cases and worked answers are included in the Companion Website to this book – www.pearsoned.co.uk/slack

Problems

1 *'Look, why should we waste our time dealing with suppliers who can merely deliver good product, on time and in full? There are any number of suppliers who can do that. What we are interested in is developing a set of suppliers who will be able to supply us with suitable components for the generation of products that comes after the next products we launch. It's the underlying capability of suppliers that we are really interested in.'*

- (a) Devise a set of criteria that this manager could use to evaluate alternative suppliers.
- (b) Suggest ways in which she could determine how to weight each criterion.

2 *'We already have a star rating system for all of our suppliers. This gives three stars to those suppliers who either have a record of success on one of our supply factors or who could achieve the very highest level of performance in our opinion. These are given three stars. At the other end of the scale, some of our suppliers occasionally score no stars for some supply factors if we have had significant problems with them. However, in upgrading all our IT applications, we have had to estimate the capabilities of some suppliers because we have not asked them to take charge of such a big project before. Also, we have had to extend our range of supplier selection factors to include project management skills. We have never used this evaluation criterion before. Table 13.6 shows how we have scored the two suppliers who comprise our short-list for this project. It also shows our estimates of how good they are at each factor of supply and their star rating in that factor.'*

- (a) Assuming that the information in Table 13.6 is reasonably accurate, which of the two suppliers would you recommend be awarded the contract?
- (b) If the company hears news that one of the suppliers (the Super-apps Company) has recently failed on a similar project, how would that affect your recommendations?

Table 13.6 Supplier selection evaluation

Supply factor	Weight	Super-apps star rating	Xerortech star rating
Cost of project	5	**	**
Quality of service	8	***	**
Quality of advice	7	**	***
Relationship	7	*	**
After-installation service	8	***	**
Range of applications	5	**	***
Project management	10	***	**

- 3 Three managers are attending a seminar on 'Getting More Value From Your Purchasing Function'. One manager is from a large retail bank, one is from a general hospital and the third is from a printing company. At the seminar they were discussing their problems during coffee. *'This is really useful. I think that even a relatively small reduction in our bought-in supplies bill could have a major impact on the profitability of our printing company.'* *'Yes, I agree, the hospital will also benefit from an exercise that would reduce the bought-in supplies bill. At the moment it accounts for almost 30 per cent of all our expenditure.'* *'Yes, at the bank we spend almost 20 per cent of our expenditure on bought-in supplies. Given that our profit is 20 per cent of our total revenue, any saving in bought-in supplies would be valuable.'* *'I have to say that profits are not so high in the printing industry. Our profits are only 10 per cent of sales revenue. However, with bought-in supplies accounting for 70 per cent of our total costs, I am sure that any reduction in bought-in supplies costs will be useful.'*

Which of these three managers would benefit most from a 5 per cent reduction in their bought-in supplies bill?

- 4 The example of the bullwhip effect shown in Table 13.4 shows how a simple 5 per cent reduction in demand at the end of supply chain causes fluctuations that increase in severity the further back an operation is placed in the chain.
- (a) Using the same logic and the same rules (i.e. all operations keep one period's inventory), what would the effect on the chain be if demand fluctuated period by period between 100 and 95? That is, period 1 has a demand of 100, period 2 has a demand of 95, period 3 a demand of 100, period 4 a demand of 95, and so on?
- (b) What happens if all operations in the supply chain decide to keep only half of the period's demand as inventory?
- 5 A three-stage supply chain is subject to monthly demand fluctuations from its end customers as follows: month 1 – 200 units, month 2 – 300 units, month 3 – 200 units, month 4 – 250 units, month 5 – 200 units, month 6 – 300 units. If the common practice in the supply chain is to always keep 0.5 months' demand in stock, what will the production fluctuations be for the operation at the extreme supply end of the chain?
- 6 How would you organize a 'virtual university'? What would be the advantages and disadvantages of such an arrangement?

Study activities



Some study activities can be answered by reading the chapter. Others will require some general knowledge of business activity and some might require an element of investigation. All have hints on how they can be answered on the Companion Website for this book that also contains more discussion questions – www.pearsoned.co.uk/slack

- 1 If you were the owner of a small local retail shop, what criteria would you use to select suppliers for the goods which you wish to stock in your shop? Visit three shops which are local to you and ask the owners how they select their suppliers. In what way were their answers different from what you thought they might be?
- 2 What is your purchasing strategy? How do you approach buying the products and services that you need (or want)? Classify the types of products and services that you buy and record the criteria you use to purchase each category. Discuss these categories and criteria with others. Why are their views different?
- 3 Visit a C2C auction site (for example eBay) and analyze the function of the site in terms of the way it facilitates transactions. What does such a site have to get right to be successful?
- 4 Find examples of how supply chains try to reduce this bullwhip effect.
- 5 **(Advanced)** Revisit the short case on TDG earlier in this chapter (see page 414).
Step 1 – Read the description that David Garman gives of the different types of companies that offer distribution services, from 'haulage' and 'storage' companies through to those companies that provide management of a whole supply chain.

Step 2 – Visit the websites of some distribution and logistics companies. For example, you might start with some of the following: www.eddiestobart.co.uk, www.norbert-dentressangle.com, www.accenture.com (under ‘services’ look for supply chain management), www.logisticsonline.com.

Step 3 – Try to place some of the companies you have investigated on Garman’s hierarchy of types of logistics service provider.

Step 4 – What do you think are:

- (a) the market promises that these companies make to their clients and potential clients?
- (b) the operations capabilities they need to carry out these promises successfully?

Notes on chapter

- 1 Source: Adam Grossberg and Mary Ward of Lucent Technologies, and Carbone, J. (2002) ‘Lucent’s Supply Chain Flattens Margins’, *Purchasing Magazine*, 19 September.
- 2 Source: Grant, J. (2002) ‘A Cautionary Tale of Roof Racks and Widgets’, *Financial Times*, 4 November.
- 3 Definition from the UK Government Purchasing Agency.
- 4 Source: Grad, C. (2000) ‘A Network of Supplies to be Woven into the Web’, *Financial Times*, 9 February.
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- 6 Wheatley, C. (2003) ‘How to Know if E-Procurement is Right for You’, *CIO Magazine*, 15 June.
- 7 Harney, A. (2000) ‘Up close but impersonal’, *Financial Times*, 10 March.
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- 9 Source: www.levistrauss.com/responsibility/conduct/guidelines.
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- 11 Source: Interview with David Garman, September 2002.
- 12 Source: Based on *The Economist* (2000) ‘Shopping Around the Web – A Survey of E-commerce’, 26 February.
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- 16 Forrester, J.W. (1961) *Industrial Dynamics*, MIT Press.
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- 22 All information taken from each company’s website.

Selected further reading

- Child, J. and Faulkner, D.** (1998) *Strategies of Cooperation: Managing Alliances, Networks and Joint Ventures*, Oxford University Press. Very much a strategic view of supply networks, but insightful and readable.
- Christopher, M.** (2004) *Logistics and Supply Chain Management: Creating Value-Adding Networks*, Financial Times Prentice Hall. Updated version of a classic that gives a comprehensive treatment on supply chain management from a distribution perspective by one of the gurus of supply chain management.
- Fisher, M.L.** (1997) ‘What is the Right Supply Chain for Your Product?’, *Harvard Business Review*, Vol. 75, No. 2. A particularly influential article that explores the issue of how supply chains are not all the same.
- Harland, C.M., Lamming, R.C. and Cousins, P.** (1999) ‘Developing the Concept of Supply Strategy’, *International Journal of Operations and Production Management*, Vol. 19, No. 7. An academic paper but one that gives a broad understanding of how supply chain ideas have and could develop.
- Harrison, A. and van Hoek, R.** (2002) *Logistics Management and Strategy*, Financial Times Prentice Hall. A short but readable book that explains many of the modern ideas in supply chain management, including lean supply chains and agile supply chains.

Hines, P. and Rich, N. (1997) 'The Seven Value Stream Mapping Tools', *International Journal of Operations and Production Management*, Vol. 17, No. 1. Another academic paper, but one that explores some practical techniques that can be used to understand supply chains.

Macbeth, D.K. and Ferguson, N. (1994) *Partnership Sourcing: An Integrated Supply Chain Approach*, Financial Times, Pitman. A readable book that represents the arguments in favour of partnership sourcing.

Womack, J.P., Jones, D.T. and Roos, D. (1990) *The Machine that Changed the World*, Rawson Associates. One of the most influential books, not only in operations management but in management in general, of the last 20 years. It deals with more than supply chains but has interesting things to say around lean supply.

Useful websites

http://www.cio.com/research/scm/edit/012202_scm Site of CIO's Supply Chain Management Research Center. Topics include procurement and fulfilment, with case studies.

<http://www.stanford.edu/group/scforum/> Stanford University's supply chain forum. Interesting debate.

<http://www.rfidc.com/> Site of the RFID Centre that contains RFID demonstrations and articles to download.

<http://www.spsychips.com/> Vehemently anti-RFID site. If you want to understand the nature of some activists' concerns over RFID, this site provides the arguments.

<http://www.cips.org/> The Chartered Institute of Purchasing and Supply (CIPS) is an international organization, serving the purchasing and supply profession and dedicated to promoting best practice. Some good links.

www.opsman.org Definitions, links and opinion on operations management.