

## **CHAPTER 1 – LOGISTICS AND SUPPLY CHAINS**

### **CHAPTER REVIEW**

The two main functions of logistics can be described as designing supply chains and then organising the flow of materials through them. The book follows this principle, and is divided into three parts. The first part gives an overall introduction to supply chain management, the second part considers the design of supply chains, and the third part concentrates on the flow of materials.

There are two chapters in the first part. Chapter 1 reviews the broad context of logistics and defines some key terms. This is an important chapter as it lays the foundations for the rest of the book.

A key point to make at the start is that 'logistics' means exactly the same as 'supply chain management'. Some people try to draw a distinction between the two, typically saying that logistics exists within a firm and supply chain management spans more firms - but this misunderstands the broad role of logistics. It is a broad function that inherently depends on integrating diverse activities.

The chapter sets the context of logistics as moving materials needed to support operations. Again, this is to illustrate its broad impact. Many authors attempt to limit logistics, saying that it is a part of marketing, but this again misunderstands its role. It is responsible for the movement and storage of materials to support all the activities of an organisation, and not just some of them. It moves materials inwards from suppliers, through core operations, and then out to customers and it does this for all organisations in a supply chain. Logistics is an essential function for every organisation – not to mention every individual – and the way that it is organised affects all levels of performance. The result is a huge industry that has major national impact.

The basic model of a supply chain has a single product moving through a series of activities and organisations from initial suppliers through to final customers. This is obviously a simplified view – but it gives a useful model. Adding other features (such as uncertain boundaries, recycling, multiple products, loops, parallel paths, etc) makes the model more realistic but the resulting 'networks' inevitably become very complex and difficult to follow. A key point is that however complicated the supply chain, every element adds value to the finished product. If any element does not add value, then it should not be included.

Logistics is essentially a service that delivers materials, so its success is ultimately judged by the level of customer satisfaction. However, every organisation can guarantee customer satisfaction if it allocates enough resources, so a more realist aim is to balance the external aims of customer satisfaction with the internal aims of efficient resource use. This balance is a key element of logistics and appears throughout the book.

Another key element is the idea of integration. Some people say that the recent history of logistics can be summarised in its transition from separate activities into a single function. Nonetheless, at the heart of logistics is a set of activities that are closely related, but still have distinct features. The book describes these activities in following chapters.

A clear message from this chapter is that all organisations rely on logistics. Logistics is essential – and the way that it is managed has a major impact on an organisation's

performance and even its survival. The rest of the book describes current thinking about this important topic.

## **CHAPTER 2 – DEVELOPMENT OF LOGISTICS**

### **CHAPTER REVIEW**

The principles of supply chain management have developed over some time, but in recent years there has been a surge of interest. There are many reasons for this, ranging from improving communications that allow global operations through to increasing concerns about the environment that encourage local operations. The chapter reviews some of the reasons for changes to logistics, together with some of the consequences.

We could give a huge list of pressures on logistics managers to introduce changes, but have only enough room for the most significant. In specific companies, there may be many other pressures for change. And similarly, managers can respond in many ways, making all kinds of adjustments to their operations. Commonly these adjustments have aimed at reducing costs or improving productivity. Perhaps one of the most significant changes in recent years is that managers are putting more emphasis on the customer service side of the 'service/efficiency' balance. This is more difficult as customer requirements vary, which has led to the growth of the 'agile' side of the agile vs lean debate.

The other clear pressure on logistics managers comes from IT and improving communications, which is allowing all kinds of new operations. However, one message that we return to later is that improved communications do not necessarily improve logistics; even when you can talk directly to lorry drivers it does not necessarily mean that they deliver their loads any faster. Many organisations have realised this and designed radically new ways of working – as illustrated by the growth of various kinds of e-business.

The pressures on logistics managers – perhaps better described as their opportunities – encourage them to adopt new practices. The chapter lists some of the most important of these, and the rest of the book describes them in more detail.

## CHAPTER 3 – LOGISTICS STRATEGY

### CHAPTER REVIEW

Logistics has developed from a series of separate activities, largely based on transport, warehousing, and procurement, where decisions were seen as largely operational or tactical. As it evolved into a single function, the strategic impact of logistics has become more evident. The purpose of this chapter is to reinforce the view that movements of materials through supply chains have a major impact on an organisation, its operations, its broad performance, and its long term success.

The chapter starts by reviewing the features of strategic decisions, and shows how logistics fits into this. In particular, it sets the context for a logistics strategy. A problem with a logistics – and any other kind of – strategy is describing exactly what it includes. We can say that it includes all the long term goals, plans, policies, etc – but decisions it is still forms an intangible concept that is difficult to visualise. Simply put, the logistics strategy contains everything that relates to the long-term activities of the supply chain.

Managers aim at an illusive goal described as 'strategic fit' which really means that their long-term plans are realistic, achievable and move the firm in the right direction. Unfortunately, designing such plans is difficult. We discussed a procedure for this, but the reality is that there are no rigid procedure for designing a strategy, and it relies heavily on management skills.

A standard feature is that the strategy must focus on some aspect of performance, rather than simply say that the organisation will do everything well. Firms are always having to compromise, and the focus shows the best position for the compromise. Porter's standard model shows three generic foci, which again raises the question of 'lean or agile'. But this is only a starting point and organisations can focus on specific features within each of these. For instance, a focus on cost leadership – or leanness – could lead to a more specific focus on low stocks or efficient warehousing. In different circumstances, a firm could choose almost any aspect of logistics for a strategic focus, but the chapter lists the most common options.

## **CHAPTER 4 – IMPLEMENTING THE STRATEGY**

### **CHAPTER REVIEW**

The last chapter discussed the design of a strategy, but this is clearly a pointless exercise unless the strategy is then implemented. This chapter describes precisely what is meant by implementation. In effect, it takes the strategy from being a set of ideas about principles, to things actually being done.

The key process for implementation is a cascade of decisions down through an organisation. This means that managers at each level of an organisation take the work of higher levels, add more details and pass the results down to lower levels. The move is from long-term concepts down to short term decisions and jobs that are done. We described reviewed the way that this might work for the logistics infrastructure. This starts with decisions in principle about how logistics might fit into an organisation, alternative ways of organising the function, placing people within this structure, motivating them, and so on. In the same way, the design of a supply chain structure starts with principles about its function, moves down through questions of its shape, the size and location of facilities, ownership – and then on to tactical and operational considerations that are discussed later in the book.

An important point is that virtually every aspect of logistics and the environment changes over time, so even the best strategy and implementation soon become dated. So strategic design – and consequent implementation – are not done once and left, but form a continuous process. The changes have to be managed, which might be done slowly through continuous improvement or more quickly through re-engineering.

## **CHAPTER 5 – INTEGRATED SUPPLY CHAINS**

### **CHAPTER REVIEW**

Some people suggest that the recent history of logistics development can be summarised as 'integration'. This is clearly a simplified view, but nonetheless increasing integration of operations is certainly an important theme of supply chain management. This chapter reviews developments in the area.

When looking for improvements in a supply chain the obvious approach is to consider a certain type of activity – perhaps inventory management – and look for improvements. But this ignores the interaction in logistics, which mean that an improvement in one activity might inevitably give worse performance in another. And the best overall result does not come when each activity is separately running well. A compromise is needed, where a reduction in performance in one areas is more than compensated by improvements in other areas.

The simple story here is that integration – which includes various kinds of co-operation – brings many benefits. This integration generally starts with the activities of logistics coming together in a single function. This is not necessarily an easy move, and includes problems that range from difficulty of integrating IT systems through to people defending their traditional roles. The next stage of integration moves out to other organisations. Not surprisingly this is a lot more difficult than internal integration, and there has been far less progress in the area. Few organisations have much idea what happens beyond their immediate suppliers and customers – and most work with a very restricted view of even their first tier suppliers and customers. Nonetheless, wider integration brings many benefits and more firms should make – and have made – steps in this direction.

Some fairly standard steps might help with integration, such as sharing information about actual sales. Other approaches – notably CRM – almost seem to be lost in the advertising jargon of consultants.

The most common forms of co-operation are the simplest, notably informal trading relations. Nonetheless, many firms have moved on from this to share information, and then form partnerships and alliances.

## CHAPTER 6 – GLOBAL LOGISTICS

### CHAPTER REVIEW

Nobody can have missed the growth of international trade, previously led by the manufacturing centres of the Pacific Rim countries and now centred on China and India. Behind these obvious symptoms has been a steady increase in world trade over many decades, as foods, oil, manufactured goods and raw materials flow through their various chains. Virtually every country and organisation (with notable exceptions) welcomes this growing trade as bringing benefits to all partners. The resulting environment includes a string of factors aimed at encouraging global trade. Virtually all major firms have responded by moving towards international – and increasingly global – operations.

Of course, not all products lend themselves to globalisation (for instance, bulky low value products, or those with a specific local appeal). There are also factors to consider like increasing oil prices and demands for local sourcing, but the trend towards global trade seems set and likely to continue for the foreseeable future.

To meet the demands for increasingly international trade, firms can take the usual options that range from licensing through to setting-up full local operations. And they can organise themselves in ways that range from national companies through to global ones. There is no single best model, and the most appropriate depends on specific circumstances. There is a trend towards a global view – where a firm sees the whole world as a single market – and this can bring distinct advantages.

Behind the apparently inexorable move towards globalisation are the corresponding increases in supply chain complexity, length and vulnerability. There is no doubt that sourcing materials from a neighbouring town is easier and less risky than sourcing it from a distant and remote supplier. The implication of globalisation is that logistics can overcome these drawbacks and still deliver a net benefit. Unfortunately, an increasing number of companies have found that this is not always true. Some have pulled back and reduced their supply chains – others have invested too heavily and have closed down.

In different circumstances, different locations are most attractive for operations (a theme that we discuss in chapter 7). And the challenge for logistics is to continue supplying the materials needed around the world. This is made difficult by the barriers in extended supply chains, which are generally described as physical, technical and fiscal (or maybe organisational or governmental). The most difficult barriers are often those built by governments to control movements across their national borders. Sometimes these are so severe that they prevent any trade; at other times they limit trade or make it more difficult. On the positive side, whenever there are such problems, intermediaries have grown to overcome them.

## CHAPTER 7 – LOCATING FACILITIES

### CHAPTER REVIEW

The last chapter looked at various aspects of global logistics. It reviewed the reasons for organisations to work internationally and the resulting effects on their operations. This chapter continues this type of concern by looking in more detail at the location of facilities. At a broad level this asks how firms choose the regions and countries to work in; at a more detailed level it considers the best cities and sites within them. Such decisions help determine the structure of a supply chain.

Organisations often have to decide where to put facilities, and not just when they expand into new markets. Even if they continue working in an established location, the implication is that this is their best choice – or more properly that even the best alternative is not good enough to make a move worthwhile.

Although each firm makes its own location decisions, there are clear trends – which we mentioned when describing global operations. Some places are becoming more popular, which others are becoming correspondingly less popular. Sometimes there are good reasons for these changes, but at other times it seems that firms are simply following the latest fashion. For instance, many European companies are outsourcing manufacturing to low cost regions. There can be good reasons for this, but it does not follow that all manufacturers should make such moves.

Location decisions follow a hierarchy, starting with a choice of region ('We will expand into North America') and moving down through choosing a city to finding an actual site ('Our store will open at 2341 Seventh Avenue North West'). This hierarchy moves down through strategic factors, through tactical and on to operational. It follows that different factors are important at each level. For instance, strategic choices about regions depend directly on the firm's mission – but by the time managers are making decisions about sites they are more interested in the time it takes to make a delivery to a customer. In practice, there are many factors to consider at each level of this complex decision area.

There are really two ways of looking at location decisions. The first finds the best location in principle, typically using geometric arguments to find the 'centre' of a set of customer demands. The second method compares available sites, and useful models here consider the costs, or intangible benefits in scoring models. Although scoring models seem an easy alternative it can be difficult to agree the important factors, their relative importance, and the score achieved by each location. Because it is essentially based on discussion and agreement, people sometimes describe scoring models as 'a way of justifying a decision that has already been made'. A specific form of the finite set approach appears in networks models, which are used for a wide range of problems that can be described by nodes connected by arcs. The most obvious problem of this type finds the best location in a road network, but similar principles apply to many different types of problem.

## CHAPTER 8 – CAPACITY MANAGEMENT

### CHAPTER REVIEW

The last chapter looked at the location of facilities and touched on the question of the number of facilities to use. This chapter continues this theme by considering how big each one should be, looking at the general area of capacity management.

Three related decisions that largely define the structure of a supply chain consider the number of facilities, their locations and their sizes. These are essentially strategic decisions, and their implementation leads on to a series of lower level decisions. These are generally described as tactical plans (aggregate plans and master schedules) and operational plans (short term schedules). It is probably easiest to imagine such plans for a manufacturer, but remember that all organisations need plans to show what they will be doing in the future. Without such plans they stumble forward not knowing what they are going to do or what conditions they will meet.

Although we talk about the capacity of a bottle as one litre or the capacity of a theatre as 450 seats, the capacity of a process refers to the maximum throughput that can be achieved within a particular time. Within this, there are variations to allow for maximum capacity, designed capacity, effective capacity, and probably other variations. And the capacity is always set by a bottleneck. The capacity of a supply chain can only be increased by increasing the capacity at the bottleneck, and when one bottleneck is removed another will appear. So the overall aim is to balance the capacity of the limiting bottleneck with the expected demand.

The balance of capacity and demand is achieved by a procedure that is sometimes called resource requirement planning (although this term now sounds too similar to MRP and its various extensions). This procedure seems straightforward in principle, but planning is always a complex and difficult job. Each stage of the planning can be difficult – assessing demand, measuring capacity, generating plans to overcome the differences, getting agreement about which are the best plans, implementing the results, etc.

Most people assume that a company generates as much demand as possible and then creates the capacity to meet this. In reality, there can be reasons why it is preferable not to meet all demand. For instance, expensive perfumes could easily lower prices and increase production to sell more – but instead they limit demand by charging high prices. In other words, they are managing demand rather than capacity. This is surprisingly common, as you can see when you try to buy a limited edition print, join a professional institution, see a doctor, travel first class on a plane, buy a Bentley, or in many other circumstances.

Whichever approach is adopted, there are questions about the timing of changes to capacity and sizes of adjustments. A particularly important point concerns short term adjustments to capacity. We have said that capacity management is essentially a strategic issue, but within this context there is room for shorter-term adjustments, which can again be achieved by managing either demand or capacity.

Another misconception about capacity is that it is fixed for some time. In practice the capacity of any process varies, even over the short term. This might be due to random effects (illness, fatigue, equipment failure, weather conditions, etc) or more systematic changes (planned maintenance, learning, aging of equipment, replacement policies, etc). These shorter term variations become more important when the capacity plans

are expanded into tactical plans and then short term schedules. The standard pattern of planning uses essentially the same approach – resources requirement planning – to design the lower level plans, with alternative approaches described in following chapters. The lower level plans are known by different names, but we stick to the most common titles of aggregate plans and master schedules.

## **CHAPTER 9 – CONTROLLING THE FLOW OF MATERIALS**

### **CHAPTER REVIEW**

The last chapters have looked at the structure of supply chains – the number facilities, their layout, capacity, etc – and now the book moves on to the next type of problem, which concerns the flow of materials through a chain. This chapter introduces the theme by considering the three alternative approaches to controlling material flows offered by traditional planning (based on resources requirement planning), material requirements planning and just-in-time.

The first part of the chapter shows how the ideas developed in the last chapter can be continued to give the traditional way of controlling the flow of materials. This has master schedules expanded to give short term schedules, which are used to control material movements. There are the usual ways of designing these schedules, ranging from negotiation through to mathematical modelling. However, the short time available to get answers and the limited consequences of errors mean that simple scheduling rules are by far the most common. Each set of circumstances can give its own scheduling rules, but the chapter illustrated a few common ones.

The traditional approach to short term scheduling has advantages, but it also has weaknesses, particularly with dependent demand for materials. When they assume that all demands are independent, managers can miss the chance of using some important information. MRP gives a way of relating material demands back to a master schedule.

MRP gives a powerful way of controlling some materials, particularly the raw materials needed for variable production. Many firms have adopted its principles, and it is a standard approach in many services. However, it is not without critics who talk about the complex systems that produce 'More Reams of Paper'. Basic systems can become enormously complicated, and this complexity is the reason why a fairly obvious approach was not used before the 1960s, when computers became available to do the large number of related calculations.

MRP systems become even more complicated when they are extended to other functions and organisations. These extensions moved progressively to ERP, which was originally seen as a means of extending MRP to other organisations in a supply chain. Unfortunately, software companies (trying to give the impression that their products offer more facilities) have largely diminished this meaning to include even minimal integration.

Just-in-time systems follow another route to material control, avoiding complex systems and administrative overheads that inevitably come with complex planning. Rather than use formal plans to push materials through a supply chain, all their operations are controlled by the pull of customer demand. This approach was developed from, say, the late 1960s when the idea of kanbans became formalised, and virtually every organisation now includes some element of JIT. It has grown into a much broader management philosophy that is aligned to leanness and removal of waste. This has transformed the way that many companies work. But JIT is not without its problems, and these can both limit the areas where it can be used and the quality of its results.

One of the most interesting aspects of JIT is that it almost requires other members of supply chains to adopt similar practices, so it gives a mechanism for integrating

external activities. These have become formalised in ECR – but we have to repeat the warning that companies rarely have much idea what is happening in their supply chains beyond their immediate suppliers and customers.

## CHAPTER 10 – PROCUREMENT

### CHAPTER REVIEW

The last chapter introduced the idea of controlling the flow of materials through a supply chain. In particular, it said that the flow could either be controlled by a schedule (using resources requirement planning or material requirements planning) or a demand pull (with JIT). In practice, these methods show the requirements for materials, but they do not manage its actual movement. This is triggered by procurement, which passes an order back to suppliers.

In the same way that some people insist that there is a difference between logistics and supply chain management, others insist that there is a difference between purchasing (which specifically refers to buying) and procurement (which includes all types of acquisition). Again this depends on semantics and definitions rather than real differences in operations. We assume that the two terms effectively refer to the same function.

The history of procurement is very similar to broad logistics, as it was considered an administrative chore that deserved little attention – until organisations realised how much it cost and how much they could save. A small improvement in purchasing often gives more benefits than a major sales drive.

Procurement consists of a series of related activities that organise the movement of materials. Remember, though, that it only organises the movement (which is the reason that it was historically considered an administrative chore) but does not actually move them (which is done by transport, or materials management). People often say that the most important part of procurement is finding the best supplier and then everything else is easier. So the initial choice is an important step, followed by continual monitoring to make sure that their performance is maintained. An important consideration in this decision concerns the number of suppliers, with the biggest choice between tendering from a short list of alliances with single sources. Neither of these is intrinsically better, and both have benefits in particular conditions.

When a firm has chosen a supplier, it has to go through some procedure for the actual purchasing. The procedure described here follows a formal route, which can be abbreviated for less important purchases or extended for more important ones. The procedure also shows the effect of e-procurement – in its different forms – in simplifying and eliminating some step. It also suggests that there are different types of purchases for different types of materials.

## **CHAPTER 11 – INVENTORY MANAGEMENT**

### **CHAPTER REVIEW**

The movement of materials through supply chains is not continuous, but they often stop and wait for something to happen. Whenever they stop moving they form stocks – which are the supplies of materials that become available before they are actually needed. These are often very expensive, and managers have been looking for effective ways of inventory management for more than a century.

An important point is that stocks (which are increasingly referred to as inventories) can serve a number of useful purposes. So managers should not invariably aim at eliminating stocks, but should look at their control. This often means finding the best balance between competing costs. Unfortunately, accounting conventions can make it difficult to put realistic values on holding stock (for instance, how much does a lost sale really cost, and what is the value of a unit held at some point in the supply chain?)

The traditional ways of controlling stocks uses quantitative models, with the EOQ as the standard approach. This suggests an order size, and although it is based on a simple model the results generally give good guidelines. The basic approach has been extended in hundreds of different models that take into account specific circumstances.

The assumption underlying these models is that holding stock brings some benefit (which contrasts to the lean view) leanness) but these benefits should be delivered at the lowest overall costs. These models have been widely used for many years, and despite the growth of MRP and JIT remain the best approaches in a variety of conditions. It is fair to say that they combine a mixture of benefits and weaknesses.

A feature of these models is that they give good guidelines for order sizes, but managers still make the final decisions and incorporate their subjective values. Managers are largely judged by their ability to maintain supplies, so there is an incentive to err on the safe side and have stocks higher than suggested. They achieve this by adding extra safety stock – and this effect is most noticeable when demand varies, when managers can set service levels and other variables that control the stock patterns.

## **CHAPTER 12 – WAREHOUSING AND MATERIAL HANDLING**

### **CHAPTER REVIEW**

The last chapter discussed inventory management, which considered the amount of materials to buy, timing of orders and so on. When these orders arrive in an organisation they have to be stored (at least for some minimum time) before they are needed, and then moved to the operations where they are needed, and so on through the rest of the supply chain. This storage and movement of materials is the theme of this chapter.

We have already said that stock serve a useful purpose, and although the trend is towards lower stocks they can never be completely eliminated. This means that there must be places to store the stocks – and these are generally referred to as warehouses. The nature of a warehouse depends largely on the type of product it stores.

There is a series of traditional activities within a warehouse that start with ordering new items (the functions of inventory management and procurement) through receiving the materials, checking, sorting, storing, picking, packing and moving them to delivery bays. Within this general picture are the other activities associated with material storage and handling. Each of these has associated facilities, with the type of equipment and its layout markedly affecting efficiency and performance.

Increasingly, warehouses are not being seen as dead storage areas, but convenient locations for doing a range of activities. At the basic level these can be consolidation or break-bulk, but are more likely to include packaging, finishing and customising – encouraged by the growth of postponement.

Related to the movement of materials is the question of packaging. This is largely used to protect goods and make handling easier. However, it becomes a more controversial issue when people perceive the amount of packaging as excessive – with consequent waste of money and resources. There is a clear trend to reduce the amount of packaging – and make it use reusable and recyclable. This trend is being encouraged by various legislation, particularly within the EU.

Another key questions concerns the ownership of warehouses, and the choice between public and private facilities. There are benefits to both of these, but the current trend is clearly towards outsourcing and use of third-party (or public) facilities.

## **CHAPTER 13 – TRANSPORT**

### **CHAPTER REVIEW**

Many people imagine logistics in terms of transport, and this is certainly one of its more visible functions. Often the most common image is a row of lorries driving down a motorway, each identified by the livery of its operator. Road transport is certainly one of the key functions of logistics, and it is often the most expensive. And global operations seem to be increasing the importance of transport, as materials move through extended chains around the world. This trend is illustrated by the aggregate growth in expenditure on transport, which for many years has outstripped the growth in aggregate GDPs.

In practice, there are many aspects of transport and firms should not blindly put materials on their own lorries, or use the nearest transport company. The first recognition is that transport is not just an essential add-on to core operations, but it is a part of the core activities and is an area that can give considerable savings. For instance, efficient transport can make a low-cost production area more attractive – or it can mean that the total cost of using these areas is higher than remaining with local operations.

Because of its flexibility and convenience, road transport is the dominant mode, and plays some part in virtually all supply chains. However, in different circumstances, other modes are better – particularly pipelines for fluids and shipping for long international journeys. Different modes have different features that are best suited to specific products and journeys.

Combining several modes in a single journey is often the best alternative, and such intermodal operations have become possible since containers gave standard load sizes. Then containers move by the most efficient mode of transport, with transfers between modes at container bases such as DIRFT (described in the 'Logistics in Practice').

As with warehousing, an important question concerns the choice between using private and public facilities – with the trend again towards outsourcing to third party operators. The majority of major companies outsource their transport to third parties to gain roughly the same benefits as found with warehousing. This is an important point, as transport is deceptively complicated and difficult to do well. The result is that large, specialist companies can design very efficient operations – while small, non-specialist companies can have surprisingly high costs. For organisations that prefer to run their own transport, there are many service providers who can offer help.

## **CHAPTER 14 – MEASURING AND IMPROVING PERFORMANCE**

### **CHAPTER REVIEW**

Managers of all types have to monitor the performance of their operations, or else they do not know how well things are going. So this chapter extends the old message, 'what you can't measure, you can't manage'. There are really several reasons to monitor performance (as suggested in the chapter) and not all aspects of performance can be directly measured.

There is a huge number of possible performance measures, and you often see organisations using several thousand of these at different points in their operations. The chapter views these in two categories. The first includes general measures that are relevant to all managers. These often focus on financial performance, because managers are generally judged by the state of their finances, they are easy to find, well-understood, and so on. They also include general measures of operations, particularly capacity, utilisation, productivity, etc. In common with all measures, these seem quite simple, but we have to be careful when interpreting them. For instance, raising productivity seems a universally beneficial aim – but it depends how we define productivity, what assumptions we make and what our real aims are.

Alongside the general measures are a huge number of measures that specifically refer to logistics. The chapter lists some of these for logistics, warehousing, transport, and so on. The problem is rarely to find appropriate measures, but to identify the most useful, importance of each, and ways of actually using the measures.

Most absolute measures are really of limited use, and managers are more likely to use ratios or other kind of comparison. There are many ways of organising these – typically using ratios of current to past performance or current to planned results. Benchmarking gives a particularly useful type of comparison, allowing firms to emulate the performance of an industry's best performers.

Measures of performance are only really a starting point, and managers have to use the information as a route to improving operations. Remember that competitors are always making improvements, so every organisation has to make things better just to stay in the same place. Usually the first step in finding improvements is to analyse the existing operations. Text descriptions are ponderous and unclear, so the best results come from diagrams. There are several formats available, usually described by the generic term 'process charts'. By analysing these diagrams managers can get ideas for improvements. In practice, the best approach is to include such analyses in a more formal procedure, such as the ones outlined in the text.

## **CHAPTER 15 – SUPPLY CHAIN RISK**

### **CHAPTER REVIEW**

Managers are becoming increasingly aware of the vulnerability of their supply chains, and are treating the area of supply chain risk management more carefully. To some extent this is just good management and extends the normal considerations of risk: but it is also a response to increasing legislation.

In principle, risk is simply the possibility that something might happen in the future. Normally we are pessimistic and assume that it is harmful, so that risk to the supply chain considers the chance of disruption. Then there is a huge number of potential risks arising from virtually any source. These are normally classified as originating internally within the supply chain, or from external factors.

There is a well-established procedure for risk analysis, largely borrowed from insurance and financial industries. This defines a standard approach as identifying the sources of risk, analysing the level of risk and potential consequences, and then designing appropriate responses. As always, this is a lot easier in theory than in practice – and even the first step of identifying risks can be difficult. And then analysing the risks and designing a suitable response can cause considerable practical problems.

One school of thought says that not enough care is taken to identify possible risks, but when one actually is recognised the response is excessive. (This is the reasoning that prohibits schoolchildren from playing conkers while allowing them to continue more dangerous activities.

There is a common feeling that the probability of harmful events occurring is rising, and so is the consequences of these events. In principle, managers are becoming better at using risk management to deal with these – but the reality is that supply chain risk management is still at a very early stage of implementation. Perhaps the most worrying concern is not that risks seem to be increasing, but that this is often caused unwittingly by managers. For example, global sourcing and lean operations come with inherently greater risk, but this is often ignored or underplayed in related analyses. Decisions need to balance competing factors, and logistics managers do not yet seem to give enough weight to risk.