

UNIT – I

LOGISTICS OF BUSINESS

Introduction

All organisations move materials. Manufacturers build factories that collect raw materials from suppliers and deliver finished goods to customers; retail shops have regular deliveries from wholesalers; a television news service collects reports from around the world and delivers them to viewers; most of us live in towns and cities and eat food brought in from the country; when you order a book or DVD from a website, a courier delivers it to your door. Every time you buy, rent, lease, hire or borrow anything at all, someone has to make sure that all the parts are brought together and delivered to your door. **Logistics** is the function that is responsible for this movement. It is responsible for the transport and storage of materials on their journey between suppliers and customers.

On a national scale, logistics involves a huge amount of effort. The USA has a gross domestic product (GDP) of US\$10 trillion,¹ so its population of 280 million produces and consumes an average of US\$36,000 of goods and services. The world's seven largest economies (USA, Japan, Germany, UK, France, Italy and Canada) have a combined GDP of US\$20 trillion. All of this – whether it is oil produced in Canada, consumer electronics in Japan, cars in the UK or dairy products in France – relies on logistics to collect materials from suppliers and deliver it to customers. Millions of people are involved in this effort, and it costs billions of dollars a year to keep everything moving.

Ordinarily we only notice a small part of logistics. We might see lorries driving down a motorway, visit a shopping mall, drive through a trading estate, or have a parcel delivered to our homes. These are the visible signs of a huge industry. In this book, we take a more detailed look at this complex function. We discuss the issues and developments, and see how managers can get the best results from their logistics.

Every organisation delivers **products** to its customers. Traditionally we have described these products as either goods or services. Then manufacturers like Sony and Guinness make tangible goods, while AOL and Vodafone provide intangible services. In reality, this view is rather misleading, and every product is really a complex package that contains both goods and services. Ford, for example, manufacture cars, but they also give services through warranties, after-sales service, repairs and finance packages. McDonald's provide a combination of goods (burgers, cutlery, packaging, and so on) and services (when they sell food and look after the restaurant). It is more accurate to describe products as lying on the spectrum shown in Figure 1.1. At one end of this spectrum are products that are

predominantly goods, such as cars and domestic appliances; at the other end are products that are predominantly services, such as insurance and education. In the middle are products with a more even balance, such as restaurant meals and hospitals.

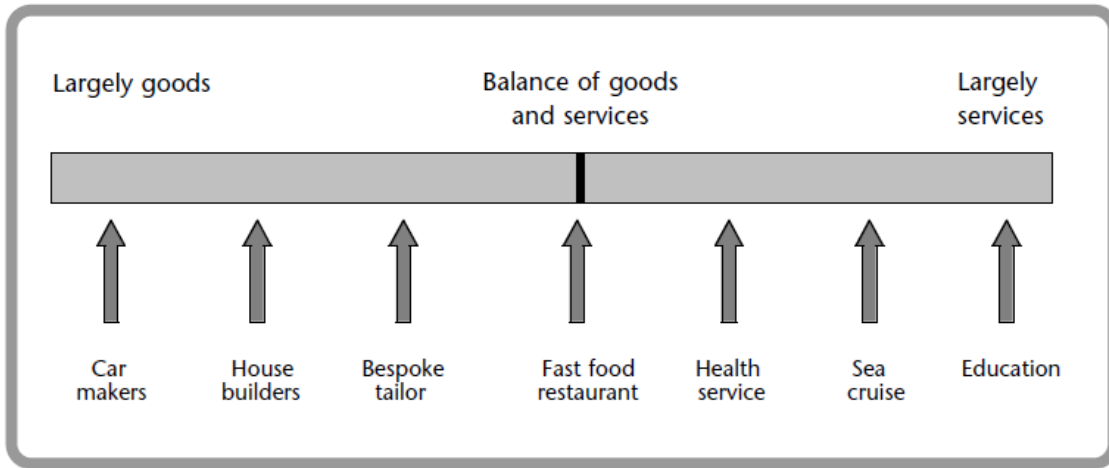


Figure 1.1 Spectrum of Products

At the heart of an organisation are the **operations** that create and deliver the products. These operations take a variety of inputs and convert them into desired outputs, as shown in Figure 1.2. The inputs include raw materials, components, people, equipment, information, money and other resources. Operations include manufacturing, serving, transporting, selling, training, and so on. The main outputs are goods and services. The Golden Lion restaurant, for example, takes inputs of food, chefs, kitchen, waiters, and dining area; its operations include food preparation, cooking and serving; the main outputs are meals, service, customer satisfaction, and so on.

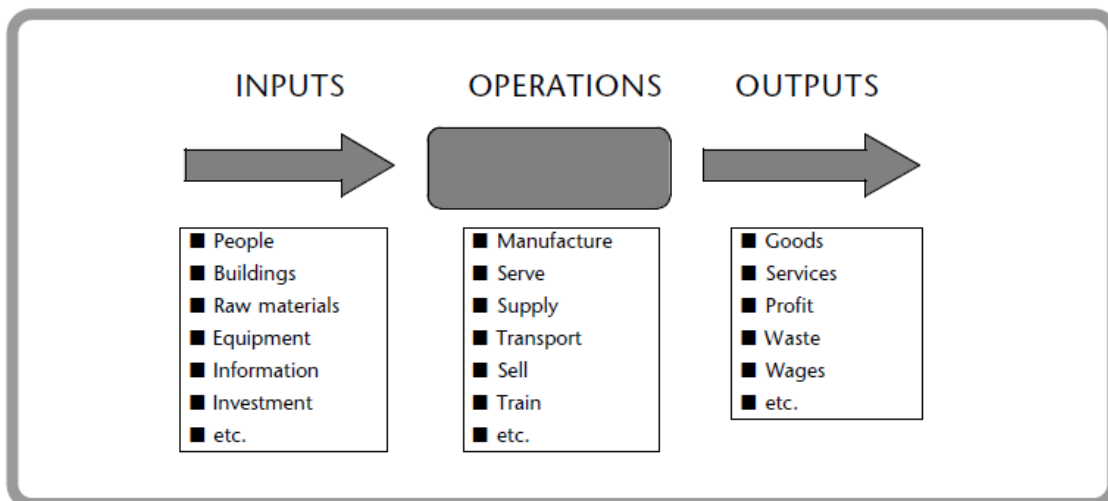


Figure 1.2 Operations creating outputs

The products created by an organisation are passed to its customers, giving the cycle shown in Figure 1.3. This shows customers generating demands, with operations using resources to make products that satisfy them. Logistics moves materials around this cycle.

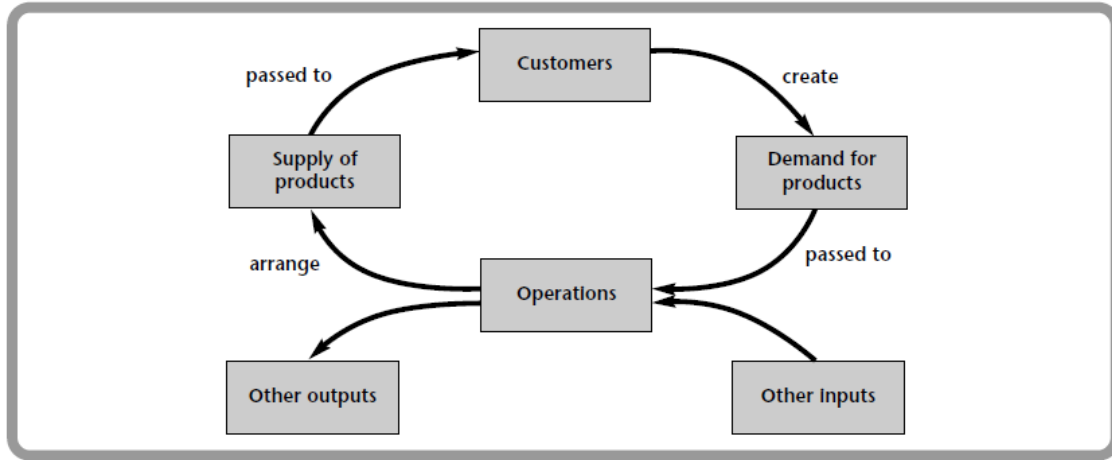


Figure 1.3 Cycle of Supply and Demand

The operations are usually divided into a number of related parts, in the way that a hospital has an emergency room, surgical ward, purchasing department, heart unit, operating theatre and so on. So logistics also moves materials through the different parts of an organisation, collecting from internal suppliers and delivering to internal customers (as shown in Figure 1.4). This leads to our basic definition.

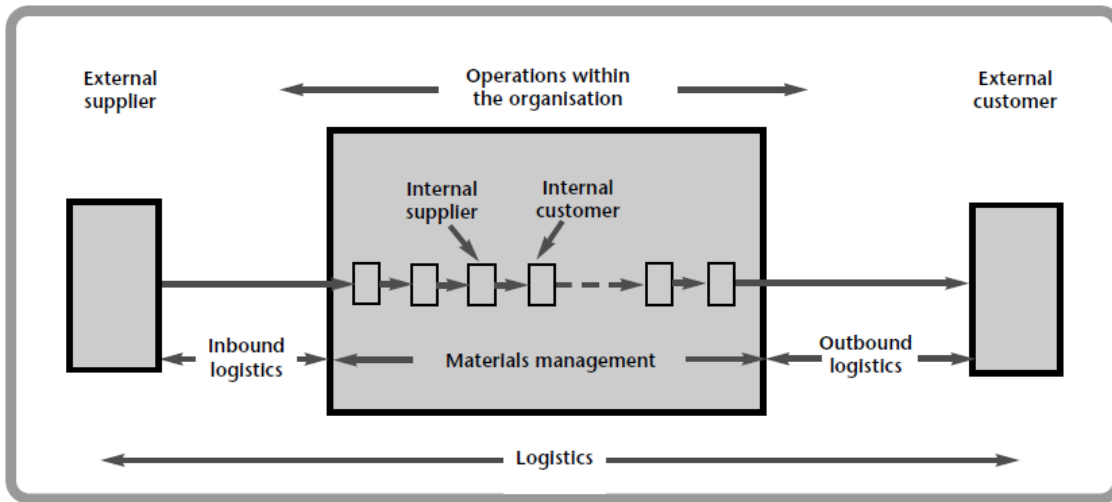


Figure 1.4 The role of logistics

Logistics is the function responsible for the flow of materials from suppliers into an organisation, through operations within the organisation, and then out to customers.

Moving materials into the organisation from suppliers is called **inbound** or **inward logistics**; moving materials out to customers is **outbound** or **outward logistics**; moving materials within the organisation is **materials management**.

Materials

In these definitions we have talked about the movement of materials – but what exactly do we mean by **materials**? Sometimes this is obvious when, for example, a power station brings coal from a mine, a farmer moves potatoes to a wholesaler, or a computer manufacturer delivers PCs to a warehouse. At other times it is less clear when, for example, a television company delivers entertainment to its viewers, a telephone company provides a communications service, or a research company creates new knowledge. Tangible goods clearly have to be moved, and you can easily see the role of logistics. Even organisations providing the most intangible services move some goods around – perhaps paperwork or consumables – so they still need logistics.

However, we can take a broader view and say that logistics also moves less tangible things, such as information and messages. Then a television company uses logistics to move around its production facilities, and also to transmit programmes to customers. In different circumstances, logistics is responsible for moving raw materials, components, finished products, people, information, paperwork, messages, knowledge, consumables, energy, money and anything else needed by operations. To simplify things, we describe all of these as **materials**.

Materials are all the things that an organisation moves to create its products. These materials can be both tangible (such as raw materials) and intangible (such as information).

The Supply Chain

So far, we have focused on the movement of materials through a single organisation. In reality, organisations do not work in isolation, but each one acts as a customer when it buys materials from its own suppliers, and then it acts as a supplier when it delivers materials to its own customers. A wholesaler, for example, acts as a customer when buying goods from manufacturers, and then as a supplier when selling goods to retail shops. A component maker buys raw materials from its suppliers, assembles these into components, and passes the results to other manufacturers. Most products move through a series of organisations as they travel between original suppliers and final customers. Milk moves through a farm, tanker collection, dairy, bottling plant, distributor, and supermarket before we buy it. A toothbrush starts its journey with a company extracting crude oil, and then it passes through pipelines, refineries, chemical works, plastics companies, manufacturers, importers, wholesalers and retailers before finishing in your bathroom. A sheet of paper moves through several organisations before it reaches our desk (illustrated in Figure 1.5).

People use different names for these chains of activities and organisations. When they emphasise the operations, they refer to the **process**; when they emphasise marketing, they call it a **logistics channel**; when they look at the value added, they call it a **value chain**, when they see how customer demands are satisfied, they call it a **demand chain**. Here we are emphasising the movement of materials and will use the most general term of **supply chain**.

Every product has its own unique supply chain, and these can be both long and complicated. The supply chain for Cadbury starts with cocoa beans growing on farms and ends with the delivery of bars of chocolate to hungry customers. The supply chain for Levi jeans starts with cotton growing in a field and ends when you buy the jeans in a shop. The supply chain describes the total journey of materials as they move 'from dirt to dirt'. Along this journey, materials may move through raw materials suppliers, manufacturers, finishing operations, logistics centres, warehouses, third party operators, transport companies, wholesalers, retailers, and a whole range of other operations. Sometimes, the supply chain goes beyond the final customer to add recycling and re-use of materials.

A Supply Chain consists of the series of activities and organisations that materials move through on their journey from initial suppliers to final customers.

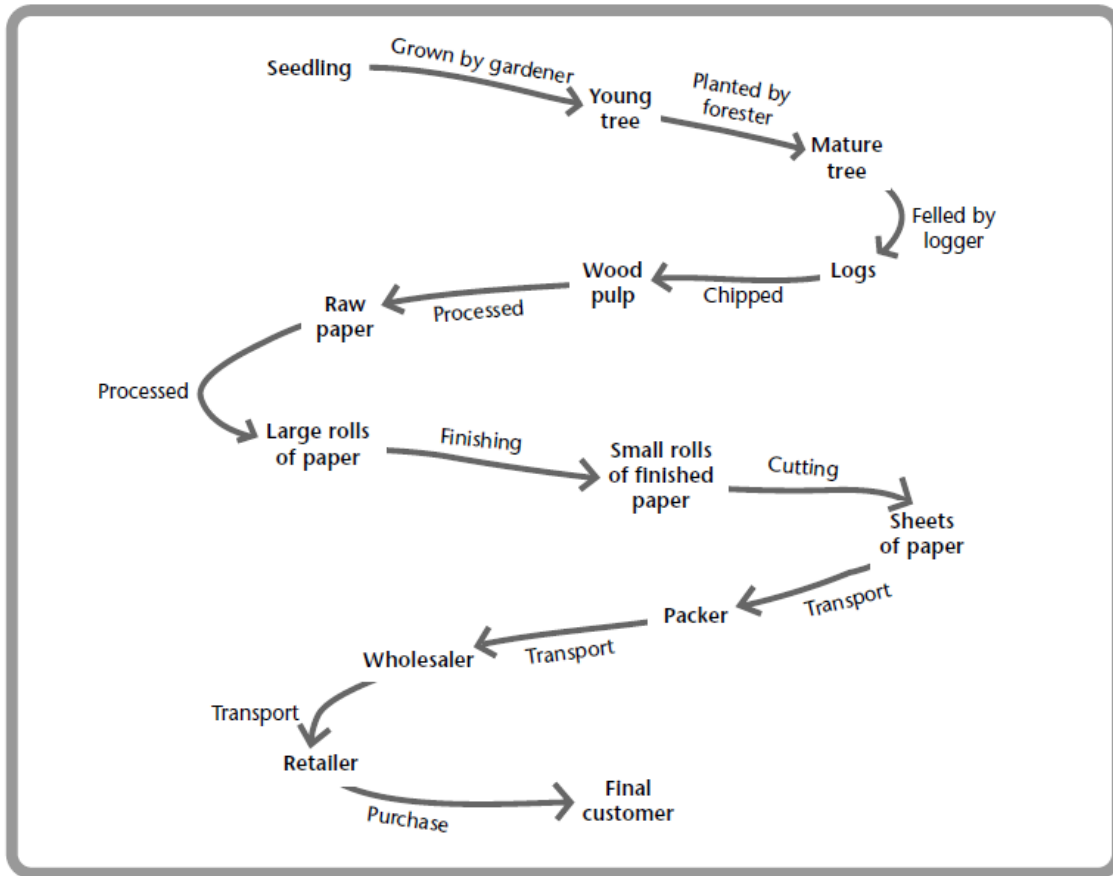


Figure 1.5 Outline of the supply chain for paper

Structure of the supply chain

The simplest view of a supply chain has a single product moving through a series of organisations, each of which somehow adds value to the product. Taking one organisation's point of view, activities in front of it – moving materials inwards – are called **upstream**; those after the organisation – moving materials outwards – are called **downstream**.

The upstream activities are divided into **tiers** of suppliers. A supplier that sends materials directly to the operations is a first tier supplier; one that send materials to a first tier supplier is a second tier supplier; one that sends materials to a second tier supplier is a third tier supplier, and so on back to the original sources. Customers are also divided into tiers. One that gets a product directly from the operations is a first tier customer; one that gets a product from a first tier customer is a second tier customer; one that get a product from a second tier customer is a third tier customer, and so on to final customers (see Figure 1.6).

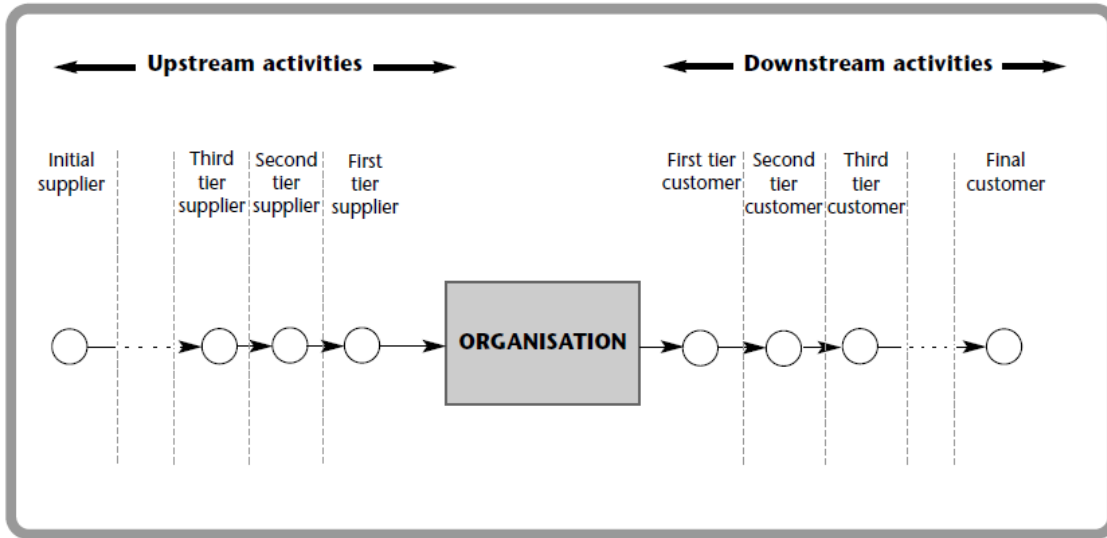


Figure 1.6 Activities in a Supply Chain

In practice, most organisations get materials from many different suppliers, and sell products to many different customers. Then the supply chain converges as raw materials move in through the tiers of suppliers, and diverges as products move out through tiers of customers. A manufacturer might see sub-assembly providers as first tier suppliers, component makers as second tier suppliers, materials suppliers as third tier suppliers, and so on. It might see wholesalers as first tier customers, retailers as second tier customers, and end users as third tier customers (as illustrated in Figure 1.7).

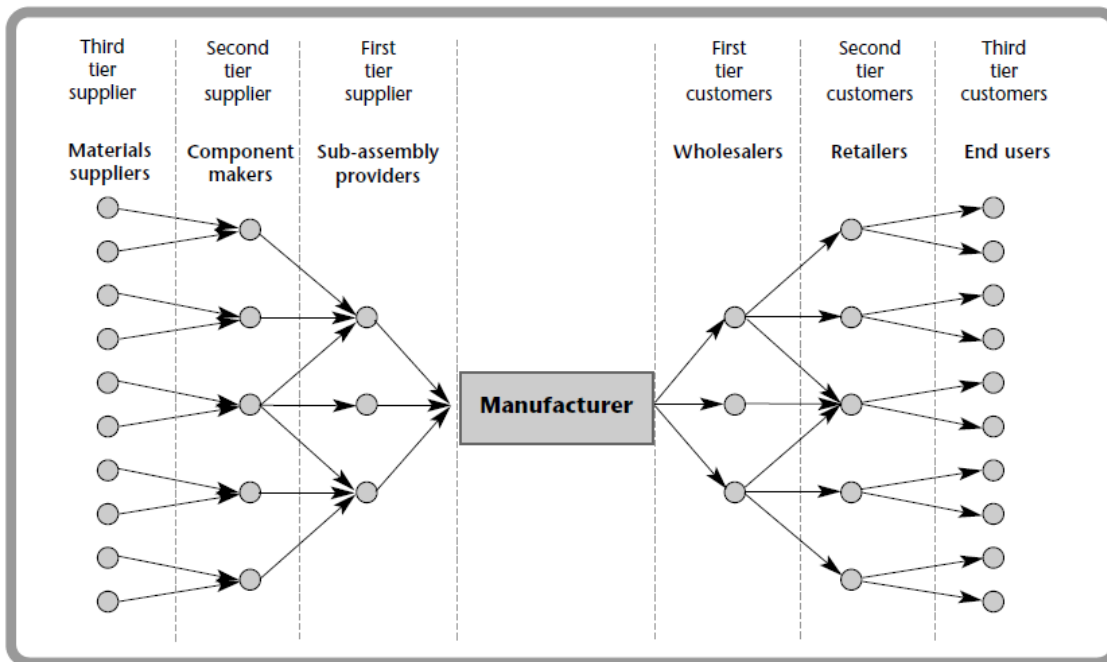


Figure 1.7 Supply Chain around a manufacturer

It is fairly easy to imagine the shape of a manufacturer's supply chain, but most other organisations use the same general approach. Airlines, for example, move passengers from pick-up points, through local feeder services to major 'hub' airports, on to another hub, and then back out through local services to their destinations; banks collect all cheques in central clearing houses before sending them back to branches and customers; blood transfusion services have regional centres that act as wholesalers for plasma.

Each product has its own supply chain, and there is a huge number of different configurations. Some are very short and simple – such as a cook buying potatoes directly from a farmer. Others are surprisingly long and complicated. An everyday product like a shirt has a long journey from the farm growing cotton through to the final customer. It also has several chains merging as buttons, polyester, dyes and other materials join the main process. In the same way, when you buy a computer, many strands of the supply chain merge as Intel provide the processor, Matshita the DVD drive, Agfa the scanner, Hewlett-Packard the printer, Microsoft the operating system, and so on.

Supply chains diverge to meet demand from different types of customer. Manufacturers of car components, for example, sell some products to car assembly plants, some to wholesalers for garages doing repairs, some to retail shops for individual customers, and some directly to customers through websites. Then the supply chain divides into separate strands with the same product following alternative routes.

As you can see, our picture of supply chains is getting more complicated, with various mergers and divisions along their length. The reality is even more complex, as each organization works with many – often thousands – of different products, each of which has its own supply chain. The French company Carrefour is Europe's largest retailer, and this comes at the end of tens of thousands of supply chains; Corus makes steel that is used in countless final products, DEL makes computers that are used for huge amounts of information transfer. Some people argue that the term 'supply chain' gives too simple a view, and they prefer to talk about a **supply network** or **supply web**. However, we will stick to the usual name, and recognise that it refers to a complex pattern of movements. You can get some idea of the size and complexity of these from the Logistics in Practice example of Wal-Mart.

Benefits of Supply Chains

Supply chains are so complicated that you might wonder if there is some way of avoiding them. Sometimes this is possible, when we move products directly from initial producers to final customers – when, for example, farm shops sell vegetables directly to consumers, or authors publish their works on the Internet. In general, though, there are very good reasons for having a longer supply chain. Suppose the population of a town decides to buy vegetables from a farm shop. This would have a minimal supply chain, but the whole population would travel separately to the farm. It would make more sense to have a transport company collect the vegetables and deliver them to a central location in the town – like a supermarket. If the transport company delivers to one town, it can easily deliver to other nearby towns, perhaps stopping at a depot to organise local deliveries. As there is a depot, vegetables can be put into storage while the supply is plentiful, and removed when there are shortages. If the vegetables need cleaning or preparation, the transport company can divert to a processing plant. Continuing in this way, you can see why a long supply chain develops, and what benefits it brings.

Supply chains exist to overcome the gaps created when suppliers are some distance away from customers. They allow for operations that are best done – or can only be done – at locations that are distant from customers or sources of materials. For example, coffee beans grow in South America, but the main customers are in Europe and North America. The best locations for power stations are away from both their main customers in cities and their fuel supplies. As well as moving materials between geographically separate operations, supply chains allow for mismatches between supply and demand. The demand for sugar is more or less constant throughout the year, but the supply varies with the harvesting of sugar cane and beet. When there is excess supply, stocks are built-up in the supply chain, and these are used after the harvests finish. Supply chains can also make movements a lot simpler. Imagine four factories directly supplying products to eight customers (as shown in Figure 1.8). Logistics has to organise 32 different delivery routes but, if the factories use a central wholesaler, the number of routes is cut to 12.

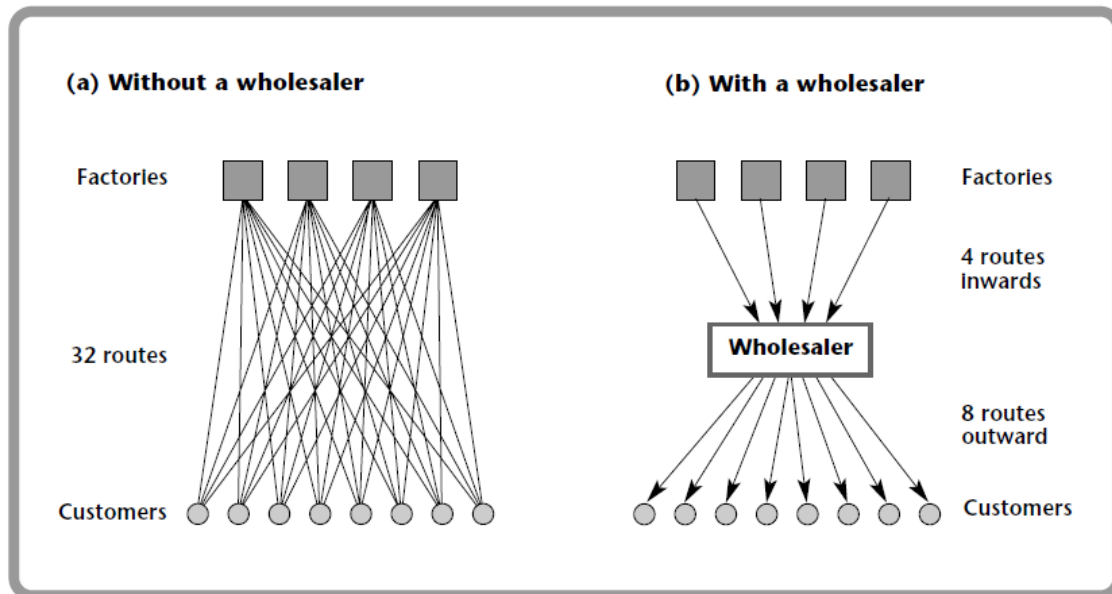


Figure 1.8 Using intermediaries to simplify the supply chain

The following list suggests some other benefits of well-designed supply chains (where we use the terms ‘wholesaler’ and ‘retailer’ as a convenient label for intermediaries):

- Producers locate operations in the best locations, regardless of the locations of their customers.
- By concentrating operations in large facilities, producers can get economies of scale.
- Producers do not keep large stocks of finished goods, as these are held further down the supply chain nearer to customers.
- Wholesalers place large orders, and producers pass on lower unit costs in price discounts.
- Wholesalers keep stocks from many suppliers, giving retailers a choice of goods.
- Wholesalers are near to retailers and have short lead times.
- Retailers carry less stock as wholesalers provide reliable deliveries.
- Retailers can have small operations, giving a responsive service near to customers.
- Transport is simpler, with fewer, larger deliveries reducing costs.
- Organisations can develop expertise in specific types of operation.

Activities of Logistics

Separate Logistics

Logistics is responsible for the movement and storage of materials as they move through the supply chain. But what activities does this include? If you follow some materials moving through an organisation, you can see that the following activities are normally included in logistics.

- *Procurement or purchasing.* The flow of materials through an organisation is usually initiated when **procurement** sends a purchase order to a supplier. This means that procurement finds suitable suppliers, negotiates terms and conditions, organises delivery, arranges insurance and payment, and does everything needed to get materials into the organisation. In the past, this has been seen as a largely clerical job centred on order processing. Now it is recognised as an important link with upstream activities, and is being given more attention.
- *Inward transport or traffic* actually moves materials from suppliers to the organisation's receiving area. This has to choose the type of transport (road, rail, air, and so on), find the best transport operator, design a route, make sure that all safety and legal requirements are met, get deliveries on time and at reasonable cost, and so on.
- *Receiving* makes sure that materials delivered correspond to the order, acknowledges receipt, unloads delivery vehicles, inspects materials for damage, and sorts them.
- *Warehousing or stores* moves materials into storage, and takes care of them until they are needed. Many materials need special care, such as frozen food, drugs, alcohol in bond, chemicals that emit fumes, animals, and dangerous goods. As well as making sure that materials can be available quickly when needed, warehousing also makes sure that they have the right conditions, treatment and packaging to keep them in good condition.
- *Stock control* sets the policies for inventory. It considers the materials to store, overall investment, customer service, stock levels, order sizes, order timing and so on.
- *Order picking* finds and removes materials from stores. Typically materials for a customer order are located, identified, checked, removed from racks, consolidated into a single load, wrapped and moved to a departure area for loading onto delivery vehicles.
- *Materials handling* moves materials through the operations within an organisation. It moves materials from one operation to the next, and also moves materials picked from stores to the point where they are needed. The aim of materials handling is to give

efficient movements, with short journeys, using appropriate equipment, with little damage, and using special packaging and handling where needed.

- *Outward transport* takes materials from the departure area and delivers them to customers (with concerns that are similar to inward transport).
- *Physical distribution management* is a general term for the activities that deliver finished goods to customers, including outward transport. It is often aligned with marketing and forms an important link with downstream activities.
- *Recycling, returns and waste disposal.* Even when products have been delivered to customers, the work of logistics may not be finished. There might, for example, be problems with delivered materials – perhaps they were faulty, or too many were delivered, or they were the wrong type – and they have to be collected and brought back. Sometimes there are associated materials such as pallets, delivery boxes, cable reels and containers (the standard 20 foot long metal boxes that are used to move goods) which are returned to suppliers for reuse. Some materials are not reused, but are brought back for recycling, such as metals, glass, paper, plastics and oils. Finally there are materials that cannot be used again, but are brought back for safe disposal, such as dangerous chemicals. Activities that return materials back to an organisation are called **reverse logistics** or **reverse distribution**.
- *Location.* Some of the logistics activities can be done in different locations. Stocks of finished goods, for example, can be held at the end of production, moved to nearby warehouses, put into stores nearer to customers, passed on to be managed by other organisations, or a range of alternatives. Logistics has to find the best locations for these activities – or at least play a significant role in the decisions. It also considers related questions about the size and number of facilities. These are important decisions that affect the overall design of the supply chain.
- *Communication.* Alongside the physical flow of materials is the associated flow of information. This links all parts of the supply chain, passing information about products, customer demand, materials to be moved, timing, stock levels, availability, problems, costs, service levels, and so on. Co-ordinating the flow of information can be very difficult, and logistics managers often describe themselves as processing information rather than moving goods. Christopher supports this view by saying that, ‘Supply chain competitiveness is based upon the value-added exchange of information’. The Council of

Logistics Management also highlights the combination of materials and information flow in their definition:

Logistics is the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customer requirements.

Depending on the circumstances, many other activities can be included in logistics. Sometimes an organisation might include sales forecasting, production scheduling, customer service management, overseas liaison, third party operations, and so on. The important point is not to draw arbitrary boundaries between functions, but to recognise that they must all work together to get an efficient flow of materials.

Organising logistics

It is probably easiest to imagine the activities that make up logistics in a manufacturer, with forklift trucks unloading pallets from lorries and moving them around warehouses. But the same principles apply in any other organisation. When a rock band goes on tour they carry huge amounts of equipment. Procurement buys everything that is needed on the tour, transport packs it and moves it to the next destination, receiving makes sure that everything arrives safely, warehousing keeps things safe until they are needed, materials handling moves things between trucks and the stage, location decides where to perform. The same types of decision are made with even the most intangible service. Insurance companies, for example, decide what kind of branch network to have, where to locate offices, who to buy telephone and other services from, how to deliver information to customers, and so on.

You can see logistics in every organisation, and it obviously comes in a huge number of different forms. The activities can be arranged in many ways within an organisation, and there is certainly no single 'best' arrangement. A small organisation might have one person looking after everything. A medium sized organisation might have one department with different sections for purchasing, transport, stock control, distribution, and so on. A large organization might have a logistics division employing thousands of people and running huge transport fleets. Sometimes all the activities are organised in a single department reporting to a logistics director; sometimes they are part of a larger department such as marketing or production; sometimes they are spread out in small pockets throughout the organisation; sometimes they are contracted out to third-party suppliers.

The current trend is towards an organisation where logistics is a single integrated function, with a logistics director – or equivalent – at its head. This follows a traditional

functional structure, with the logistics director working with directors in production, finance, sales, human resources, and so on (as shown in Figure 1.9a). There are many variations on this, with a common one found in companies organised around products or projects. Then some logistics might exist in each division, with a matrix structure allowing co-ordination of the overall function (shown in Figure 1.9b).

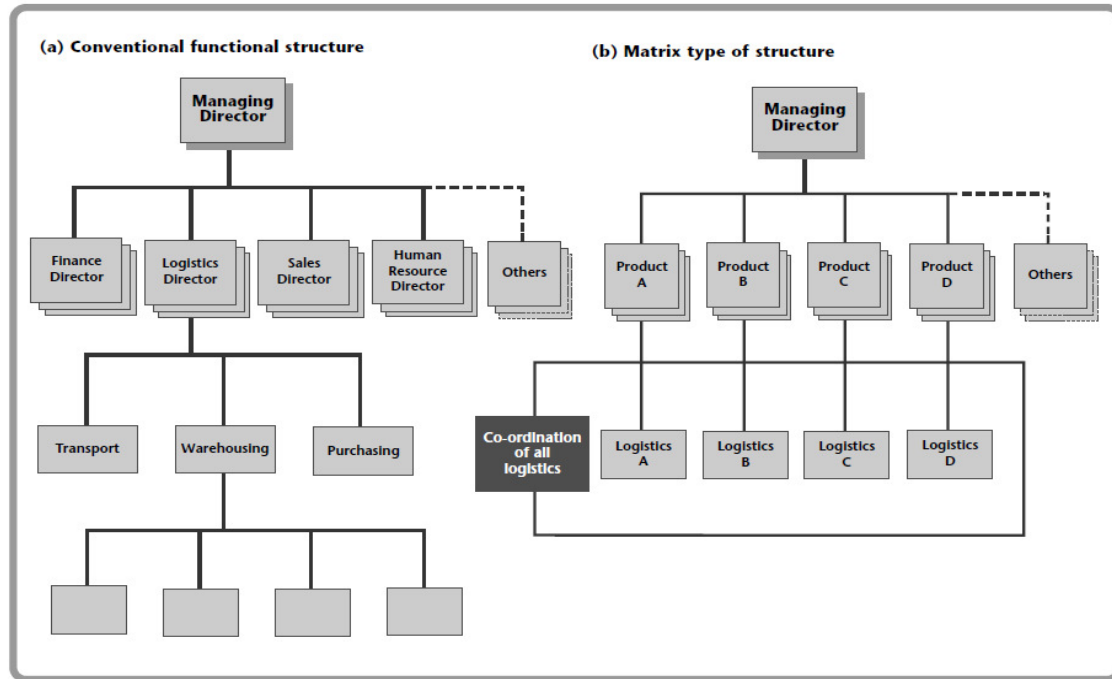


Figure 1.9 Examples of Organisational Structure

AIMS OF LOGISTICS

Logistics is responsible for the flow of materials through a supply chain. This function is also called **supply chain management**. Some people argue that logistics is somewhat narrower and concentrates on the movement within a single organisation, while supply chain management takes a broader view of movement through related organisations. This is, however, largely an argument over semantics rather than real differences in practice. Here we will stick to the convention that the two terms refer to exactly the same function. This view is supported by the Institute of Logistics and Transport – the main professional body within the UK – who give the following definitions.

Logistics is the time-related positioning of resources, or the strategic management of the total supply-chain.

The **Supply-Chain** is a sequence of events intended to satisfy a customer.

Some people also talk about logistics management, business logistics, distribution management, materials management, merchandising, or a series of other terms. Sometimes you have to be careful as these terms can refer to specific parts of the supply chain or slightly different activities. When someone talks about, say, 'distribution management' you should be clear about whether they mean transport, physical distribution, the whole of logistics, or some other function. With our broad view, logistics managers have two main aims. The first is to move materials into, through, and out of their own organisation as efficiently as possible. The second aim is to contribute to an efficient flow through the whole supply chain. Traditionally, managers concentrate on the first of these, focusing on those parts of the supply chain that they directly control. Hopefully, if each organisation looks after its own logistics properly, materials will move efficiently through the whole chain, thus achieving the second aim. To some extent this is true. It is not, however, inevitable and organisations really need a more positive approach to co-operation. We will discuss this in the next chapter. Here, though, we look at the more immediate aims of logistics within an individual organisation.

We have said that managers aim for an efficient movement of materials – but what exactly do we mean by 'efficient'? There are several answers to this, including fast deliveries, low costs, little wastage, quick response, high productivity, low stocks, no damage, few mistakes, high staff morale, and so on. Although these are all worthy goals, they are really indicators rather than real aims. To find the real aim of logistics, we must relate it to the wider objectives of the organisation.

Ultimately, the success of every organisation depends on customer satisfaction. If it does not satisfy customers, it is unlikely to survive in the long term, let alone make a profit, have high return on assets, add shareholder value, or achieve any other measure of success. So organisations must deliver products that satisfy customers. Unfortunately, customers judge products by a whole series of factors. When you buy a DVD, for example, you judge its contents, appearance, how easy it is to buy, how long you wait, how expensive it is, whether the right DVD was delivered, whether it was damaged, how courteously you were treated by sales staff, and so on. Some of these factors clearly depend on logistics – the availability of the DVD depends on stocks; the delivery time depends on transport; damage is prevented by good material handling; the price is affected by logistics costs. So we can phrase the overriding aim of logistics in terms of customer service. It has to organise the movement of materials in the best way to achieve high customer satisfaction.

Any organisation can give outstanding customer service if it is prepared to allocate enough resources. The problem, of course, is that more resources come with higher costs.

There is a limit to the amount that customers will pay for a product and, therefore, on the service that can be given. Then a realistic aim for logistics balances the service given to customers with the cost of achieving it.

The overall **aim of logistics** is to achieve high customer satisfaction. It must provide a high quality service with low – or acceptable – costs.

We can phrase this balance in terms of perceived customer value. Logistics adds value by making products available in the right place and at the right time. If a product is available at the place it is needed, logistics is said to have added **place utility**; if it is delivered at the right time, logistics has added **time utility**. Then we can phrase the aim of logistics in terms of getting the highest customer utility or perceived value. In essence, we are trying to maximize the difference between perceived value and actual costs.

People often summarise the aims of logistics as getting, ‘the right materials, to the right place, at the right time, from the right source, with the right quality, at the right price’. This is broadly correct, but it depends on how we define ‘right’. In different circumstances, logistics is judged by completely different measures of performance. When you post letters, you sometimes want them delivered quickly, sometimes as cheaply as possible, sometimes with high security, sometimes at a specified time, and so on. Managers have to design logistics that are flexible enough to satisfy a variety of needs. There are two aspects to this. The first is concerned with planning, when managers take a strategic view and design the best possible supply chain for their circumstances. We look at these strategic decisions in Chapters 3 and 4. The second concern is about execution, when materials move through this chain as efficiently as possible. Harrington summarises this double role by saying that, ‘logistics is both the glue that holds the materials/product pipeline together and the grease that speeds product flow along it’.

Supply Chain Synchronization

Many manufacturing facilities are pursuing the goal of supply chain synchronization, but how exactly do you get there and what does it look like? Supply chain synchronization looks like a world where information is collected, analyzed, and utilized in real time. This process aids production facilities through buyers being able to manage their path order lifecycle with accuracy in real time. Suppliers are able to organize raw materials and plan production according to realistic lead times, which ultimately enables logistics providers to also be able to determine shipping requirements with certainty.



All of these components working together help push the production process along in the most efficient and optimal manner through supply chain synchronization. While this may sound rather simple, there are a few steps to take in order to efficiently synchronize your supply chain process. Therefore, here are the five steps to achieve supply chain synchronization.

The five steps to achieve supply chain synchronization include the following

1. Collaboration and Engagement Facilitation
2. Visibility Establishment
3. Collecting Real-Time Data
4. Monitoring, Managing, and Executing
5. Measuring, Remodeling, and Re-Engineering

UNIT – II

TRANSPORT FACILITY

When you talk about logistics, most people imagine lorries driving down a motorway. As we know, logistics has a far wider meaning, but transport is certainly one of its main components. In the last chapter we saw that materials handling is concerned with movements within a facility. Here we will look at **transport**, which is concerned with the movement of goods between facilities.

Transport is responsible for the physical movement of materials between points in the supply chain.

As we have already seen, e-commerce can have a major effect on an organisation's logistics. But remember that it is essentially part of the information system. When you look at a company's website you can see descriptions of its products, send an order and arrange payment – but you still need transport to deliver it. Sometimes, of course, you buy intangibles such as information, software or music, and the website can deliver it. But most products are more tangible, and they need transport. At the heart of logistics are transport vehicles moving goods between suppliers and customers. This is why transport in the UK employs 1.3 million people out of a workforce of 27 million¹ and, along with storage, generates 6% of the GDP.

Mode of Transport

The **mode of transport** describes the type of transport used. There are basically five different options – rail, road, water, air and pipeline. Each mode has different characteristics, and the best in any particular circumstances depends on the type of goods to be moved, locations, distance, value and a whole range of other things. Sometimes there is a choice of mode, such as rail or ferry across the English Channel; road, rail or air between Rome and Geneva. Often, though, there is little choice. If you want to deliver coffee from Brazil to Amsterdam, you will use shipping; if you want to move gas from the Gulf of Mexico to Dallas, you use a pipeline; if you want an express parcel service across the Atlantic, you use air freight.

Rail Transport

Rail transport is most commonly used for heavy and bulky loads over long land journeys. Trains can maintain a consistent, reasonably high speed, and can link with other modes to carry containers and bulk freight. Costs can be reduced by sharing facilities. Some countries have several train operators using commonly owned tracks, or tracks owned by another company. Such arrangements are not common and they present obvious problems for operations. One advantage of rail is that once the infrastructure is in place, it has very high

capacity and low unit costs. This is another factor that discourages competition, as a track built by one organisation between two points, will generally have enough capacity to meet all demand, and it becomes unviable for a competitor to open parallel facilities.

Another advantage of rail is that the unit transport cost is low, so it can be used to move large volumes of relatively low-priced materials, such as coal and minerals. For this reason, rail transport is more common in the earlier, upstream, parts of the supply chain. You are more likely to see organisations using rail for inbound raw materials than outbound finished goods.

The main disadvantage of rail is its inflexibility. All train services have to be timetabled in advance, so that they can all fit onto the same tracks. This leaves little flexibility for last minute or emergency deliveries. Despite this, train operators can provide a number of different services, perhaps offering merry-go-round services (where a train continually moves between two locations, such as a port and a factory), full train services (where customers hire an entire train), full wagon load attached to scheduled services, container transport, or shared wagons on scheduled services.

Road Transport

Road is the most widely used mode of transport and is used – at least somewhere – in almost all supply chains. Its main benefit is flexibility, being able to visit almost any location. Although the maximum speed on roads is limited, this ability to give a door-to-door service avoids transfers to other modes and can give a shorter overall journey time. You can see this effect if you want to travel between, say, Paris and Brussels. The plane travels faster, but when you add on the travel times to and from the airports, check-in and boarding, it is faster to catch a bus between the city centres. Nonetheless, travel speed can be an important consideration, especially as roads are becoming more congested and vehicles are likely to move even more slowly.

Road transport has the advantage of being able to use extensive road networks. Unlike rail, these already exist, so users do not have to build and maintain their own tracks. Also, vehicles do not have to keep to such rigid timetables, so they can go on journeys at short notice and with little planning.

In contrast to rail, where each operator is likely to have a (near) monopoly over some route, road transport is characterised by a large number of carriers working in the same areas.

There are a huge number of different types of road vehicle. Many of these are specialised, and designed for specific purposes, and there are different regulations in different countries.

The following list mentions some of the more important types.

- *Delivery vans* are the small delivery vehicles which can carry a tonne or two in a sealed body. Smaller vans are based on car designs, while larger ones – such as Luton Box vans – are like small removal vans.
- *Flat-bed lorries* are basic, rigid vehicles with two or three axles, and a flat platform that is used to stack materials. Materials are tied on, or small sides are added.
- *Box-bodied lorries* are like the flat beds, except they have bodies added, traditionally with access from the rear. These give more protection than flat beds. In the 1970s Boalloy added curtain siding to give easier access to the load.
- *Articulated lorries*, are more manoeuvrable than rigid lorries, so they can be bigger, up to the legal weight limit. There are many variations on the theme of trucks that bend in the middle. A common format has a two- or three-axled tractor and a two- or three-axled trailer.
- *Lorry and trailer*, which combine a rigid lorry pulling a two-axle trailer. This gives greater capacity than an articulated lorry, but maintains some of its manoeuvrability.

Water Transport

Both rail and road transport have the obvious limitation of only being used on land. Most supply chains use shipping to cross the oceans at some point, and over 90% of world trade is moved by sea.

There are basically three types of water transport – rivers and canals (usually called inland waterways), coastal shipping (moving materials from one port to another along the coast) and ocean transport (across the major seas). Many countries have well-developed river and canal transport, such as Canadian and US use of the St Lawrence Seaway, and European use of the Rhine. We normally associate river transport with smaller loads, perhaps narrow boats and barges. But river systems can carry ocean-going ships for surprisingly long distances. The Mississippi, for example, is navigable to Minneapolis, more than 2500 km from the Gulf of Mexico, and Chicago is a major port in the American prairies.

Realistically, though, most shipping is done by large vessels travelling through the world's shipping lanes. Some countries are fortunate enough to have a coastline that can be used for international transport, and cities such as Rotterdam, Hong Kong and New York have developed huge ports. The world's 20 biggest ports handle over half of all world trade.

The main drawback with water transport is, of course, its inflexibility in being limited to appropriate ports. Journeys from suppliers and to customers inevitably need a change of mode, even if they are close to ports.

One interesting aspect of shipping is the continued existence of conference services. This means that all carriers in a given area agree to charge a common price and regulate the frequency of their service. The justification of this cartel is that it guarantees a more regular service than would otherwise be available. However, many people question this idea of price fixing, and non-conference lines now offer deep discounts.

Air Transport

Because of its low unit costs, water transport is the most common mode for international transport. Sometimes, though, its slow speed is unacceptable. If, for example, you run a factory in Argentina and a critical machine breaks down, you do not want the spare part to be put on the next scheduled ship from Japan, which will arrive in four weeks time. In such circumstances the alternative is air transport.

Passengers account for most airline business, with eight billion passenger kilometres flown a year in the UK.³ This continues to grow despite some hiccoughs (in, say, 2001), with low-fare carriers (Ryanair, Virgin Express, Go, easyJet, buzz, and so on) accounting for around 25% of the market.¹⁰ Airlines also carry a significant amount of freight, for products where speed of delivery is more important than the cost. In practice, this limits airfreight to fairly small amounts of expensive materials. Perhaps the most common movements are documents and parcel delivery, with carriers such as Federal Express and UPS.

There are three main types of operation. The first type is regular service, where major airlines use the cargo space in passenger aircraft that is not needed for baggage. The second type is cargo service, where operators run cargo planes on regular schedules. These are public carriers, moving goods for any customers. The third type is charter operations, where a whole aircraft is hired for a particular delivery.

In common with shipping, airlines have problems getting materials to and from their journeys. There are all sorts of facilities located around major airports for moving materials from sources onto the right planes, and then away from planes and out to customers. Unfortunately, these transfers again take time, and can reduce the benefits of air travel.

Another problem for airlines is their costs, over which they have very little control. They have a combination of high fixed costs (aeroplanes are expensive to buy) and high variable costs (due to fuel, landing fees, staff, and so on). It is expensive to keep planes flying, and there is no real way of reducing these costs. Competition can also be fierce,

putting a limit on the amount they can charge, and this frequently sends new airlines into bankruptcy.

Pipeline

The main uses of pipelines are oil and gas together with the utilities of water and sewage. They can also be used for a few other types of product such as pulverised coal in oil. Pipelines have the advantage of moving large quantities over long distances. Unfortunately, they have the disadvantages of being slow (typically moving at less than 10 km per hour), inflexible (only transporting between fixed points), and only carrying large volumes of certain types of fluid. In addition, there is the huge initial investment of building dedicated pipelines. Despite this initial investment, pipelines are the cheapest way of moving liquids – particularly oil and gas – over long distances. Local networks can add flexibility by delivering to a wide range of locations (such as supplies of water and gas to homes).

Choice of mode

Sometimes the choice of transport mode seems obvious: if you want to move heavy items between Singapore and Brisbane you will use shipping. For land journeys, many organizations seem happy to put materials on lorries without much thought for the alternatives. In practice, the choice of mode depends on a variety of factors. Perhaps the main ones are the nature of materials to move, the volume and distance. Other factors include:

- value of materials, as expensive items raise inventory costs and encourage faster modes
- importance, as even low-value items that would hold up operations need fast, reliable transport.
- transit times, as operations that have to respond quickly to changes cannot wait for critical supplies using slow transport
- reliability, with consistent delivery often being more important than transit time
- cost and flexibility to negotiate rates
- reputation and stability of carrier
- security, loss and damage
- schedules and frequency of delivery
- special facilities available.

Many other factors may be important for a final decision. Organisations that routinely use the cheapest mode may be performing badly by some of the other measures. Remember

that transport costs are often a relatively small part of overall costs, and it can be worth paying more to get a rapid and reliable delivery.

As a rule of thumb, the cheapest modes of transport are the least flexible. The following table shows a ranking for the cost, speed, flexibility and load limits of different modes of transport. The modes are ranked in order, with 1 being the best performance and 5 being the worst.

| | Rail | Road | Water | Air | Pipeline |
|----------------------|------|------|-------|-----|----------|
| Cost | 3 | 4 | 1 | 5 | 2 |
| Speed | 3 | 2 | 4 | 1 | 5 |
| Flexibility | 2 | 1 | 4 | 3 | 5 |
| Volume/weight limits | 3 | 4 | 1 | 5 | 2 |
| Accessibility | 2 | 1 | 4 | 3 | 5 |

Of course, organisations do not have to use the same mode of transport for an entire journey. They can break the journey into distinct stages and use the best mode for each stage.

- *Transport is responsible for the movement of materials between facilities in the supply chain. It involves many related decisions about the best mode, ownership, organisation, routes, and so on.*
- *Transport is an essential part of logistics. e-Commerce can deliver intangible materials, but most products include goods which need transport for delivery to customers.*

Transport Documents

There are numerous documents involved in International Trade: commercial documents, financial documents, insurance documents, and more. Here let's look at some of the common documents used for transport in global supply chain management.

Delivery Order

A Delivery Order (D/O) is a document from a consignee, an owner or an agent of a freight carrier that orders the release of the transportation of cargo to another party. This written order allows for the direct delivery of goods to a warehouseman, carrier or another person who issues warehouse receipts or Bills of Lading. This document should not be confused with delivery instructions. Delivery Instructions provide specific details to carriers regarding the arrangement made by the forwarder to deliver the merchandise to a particular destination.

Dock Receipt

A Doc Receipt confirms that cargo has been received for shipment. This document is issued by a shipping company and transfers the accountability for the safe transport of the cargo from the shipper to the carrier. It is the basis for preparing the bill of lading.

Bill of Lading (B/L)

A Bill of Lading is evidence that there is a contract between a shipper of goods and a carrier. The customer typically needs this original copy as proof and in order to take ownership of the goods. This document includes the conditions under which the transportation was conducted and acts as a receipt. This document may be endorsed or transferred to a third party even while goods are in transit.

Sea Waybill

A Sea Waybill is a contract that is not needed for cargo delivery and is only issued as a cargo receipt. This document of title is used on a trust basis between the shipper and importer, which means that no Bill of Lading is necessary and goods are automatically authorized to be released once they arrive at the destination.

Air Waybill

An Air Waybill (AWB) is used when carrying goods via air transport. This document acts as a receipt of goods and reports the condition of the goods. This is a non-negotiable document that must name a recipient (may be the buyer). The AWB indicates acceptance of goods for carriage. It is prepared by IATA agents or airlines.

Shipping Guarantee

A Shipping Guarantee is a written document issued by the bank which will take on joint liability. It is handed from the importer to the carrier or its agent for picking up the goods. This document is used in case of arrival before shipping documents.

Packing Note or List

A Packing List provides the information needed for transportation purposes. It includes the details of the invoice, the buyer, and the consignee, country of origin, transport date, delivery destination, shipping and container marks, weight and volume. It is a more detailed version of a commercial invoice and excludes pricing information. It is typically attached to the shipment and a copy is sent to the consignee so that he or she can check the shipment once received. It is not required by all countries, but by some.

UNIT – III

INTERNATIONAL LOGISTICS

Logistics and the economy

Despite short-term fluctuations in the economic climate, international trade continues to grow at a remarkable rate. Leontiades¹ notes that:

One of the most important phenomena of the 20th century has been the international expansion of industry. Today, virtually all major firms have a significant and growing presence in business outside their country of origin.

This trade is based on the recognition that an organisation can buy things from a supplier in one country, use logistics to move them, and then sell them at a profit to a customer in another country. Improved communications, transport, financial arrangements, trading agreements, and so on, mean that organisations search the world to find the best location for their operations. Then international logistics move the related materials through long and complex supply chains.

International Logistics occur when supply chains cross national frontiers.

In principle, international trade does not necessarily lead to international companies. In practice, however, the two are inseparable. If an organisation moves into a new country, it can keep a close check on new operations by controlling these from existing headquarters and giving local operations very little autonomy. This is, however, inflexible, and it does not allow local organisations to adapt to their own conditions or develop skills. An alternative is to devolve decisions. Then a company might become *international* (maintaining its headquarters in the home country and running worldwide activities from there), *multinational* (opening subsidiary headquarters around the world so that each area is largely independent) or *global* (treating the whole world as a single, integrated market). The distinction between these may not be so clear, and an organisation may choose other formats, perhaps working internationally in one area and multinationally in another.

Perhaps half of the trade between industrialised countries is accounted for by trade between subsidiaries of the same company.² In developed countries this is particularly noticeable, with a third of US exports being products sent by American companies to their overseas subsidiaries, and another third being products sent by foreign manufacturers back to their home market.

Some people prefer the term **global logistics**, to suggest integrated operations in an international setting. This can bring a whole range of new problems. Some of these are

practical, such as physically moving materials across a frontier and organising transport over longer distances; some are cultural, such as speaking new languages and meeting different customer demands; some are economic, such as paying local taxes and tariffs.

It is patently obvious that the world is not a single homogenous area. There are differences in terrain, physical features, climate, infrastructure, population density, economic strength, political systems, cultures, and just about everything else. From a logistics point of view, any of these factors can give problems – it is, for example, more difficult to cross some national borders than it is to cross a mountain range, and a truck driver crossing Europe must adapt to repeatedly changing customs and languages.

One factor that is always important for logistics is the economic strength of a region. In general terms, stronger economies:

- move more materials, as they can afford to consume more products
- have more efficient logistics, due to better infrastructure, systems and support.

Porter looked at the reasons why nations are prosperous and said that ‘a nation’s ability to upgrade its existing advantages to the next level of technology and productivity is the key to its international success’. He listed four important factors for this:

- *factor condition* – which is a nation’s ability to transform basic factors such as resources, education and infrastructure into competitive advantage
- *demand conditions* – such as market size, buyer sophistication and marketing
- *related and supporting industries* – which include logistics, partners and intermediaries
- *company strategy, structure and competition* – which give the market structure and features of domestic competition

You can see that logistics appear – at least implicitly – several times on this list. To put it simply, trade increases prosperity, and trade depends on logistics.

Factors that encourage international trade

Governments have given almost universal support for increasing trade. Over the years they have signed many international agreements on trade, and have formed a range of organizations like the General Agreement on Tariffs and Trade (GATT), Organisation for Economic Cooperation and Development (OECD), and World Trade Organisation (WTO). There have also been significant developments in free-trade areas, such as the European Union, North American Free Trade Agreement, Association of South-East Asian Nations Free Trade Area and Southern Common Market of South America.

Largely as a result of these policies world trade continues to grow. The growth was about 10% in 2000 and 7% in 2001, compared with an average of 6.5% for the period 1990–99. The value of merchandise exports in 2001 was about \$6 trillion with commercial services adding another \$1.5 trillion. The following list shows some factors that encourage this international trade:

- *Growing demand in new markets:* Many regions of the world are becoming more prosperous and are consuming more goods. Foreign companies recognise the opportunities in these growing markets and expand to sell their products in new markets.
- *Demand for foreign products:* Customers travel, watch television and use the Web to see products available in different areas. They demand new products that cannot be supplied by domestic companies.
- *Convergence of market demands:* Centralised manufacturing only works if different markets accept the same products – or at least products with minor differences in the finishing. There is clear evidence for a convergence in tastes – which Ohmae calls ‘Californianisation’ – which allows Coca-Cola, McDonald’s, Toyota and Sony to sell the same products in virtually any country.
- *Removal of trade barriers:* One of the major forces towards global free trade was the General Agreement on Tariffs and Trade (GATT) which stipulated that all its members should be treated equally. Countries in several regions have taken this idea further to create free trade areas. These have encouraged trade by easing trade restrictions and reducing tariffs, and are one reason why the amounts collected as tariffs fell from 20% of trade in the 1950s, to 7% at the beginning of the 1990s, and 3% by 2000.
- *Manufacturers aiming for economies of scale:* There have been significant changes in manufacturing operations, many of which depend on, or work best with, a stable, large-scale production. The best size for these facilities is often larger than demand from a single market. The result is centralised production, with economies of scale giving lower unit costs that more than cover any increased costs of logistics.
- *Specialised support:* As we have already seen with warehousing and transport, many organizations are concentrating on their core competencies and are outsourcing other activities. A major industry has grown of specialised support companies that can help with, say, exporting, international transport, trade credit, foreign exchange, customs clearance, and so on.

- *Integration of the supply chain:* Integration of the supply chain works towards a smooth movement of goods from initial suppliers through to final customers. This only becomes possible when national frontiers are transparent, and this means that the same organization has to work on both sides of the border.
- *Greater demands on suppliers:* Customers are putting more demands on suppliers – including just-in-time operations, total quality, strategic alliances, customisation, and so on. Local suppliers may not be able to meet these demands, and organisations may have to look further afield to find the best sources.
- *Changing practices in logistics:* Developments in logistics can make trade easier. Containerisation, for example, made the movement of goods easier, cheaper and more reliable. This encouraged many companies to move profitably into new markets. Similarly, ‘postponement’, allows products to finish manufacture at a later point in the supply chain and be more flexible to customer demands.
- *Improved communications among customers:* Satellite television, the Internet and other developing communication channels have made customers more aware of products from outside their local regions. This has stimulated demand in new markets, increased brand recognition and encouraged convergence in tastes and product demands.
- *Improved communications in business:* Developments in information systems – ranging from EDI to on-board systems in vehicles – can fundamentally change the way organizations work. They allow more flexible operations, including efficient logistics in even remote areas.

Clearly some products are more suited to international trade than others. Some factors that encourage local, rather than international, suppliers are products that:

- have relatively low value, or value density
- deteriorate or have short shelf life
- are sensitive to cultural and other differences
- have little differentiation between competitors, or brand loyalty
- need high customer contact or personal service
- have less emphasis on cost
- give limited economies of scale in production
- generate social or political pressures to produce locally
- have uneven development of markets.

Problems with International Logistics

Differences in logistics

International logistics are different from national logistics, and it is not just a case of moving the same activities to another location. We can list some of the common differences as follows:

- international trade usually has much bigger order sizes, to compensate for the cost and difficulties of transport
- international markets are more erratic, with large variations in the demand and importance of any market
- most organisations have less experience with international logistics, so they are working in areas where they have less expertise
- there are more intermediaries, such as freight forwarders and customs agents
- the intermediaries and distances involved make relations with customers more difficult and remote
- communications become more difficult at a distance and across cultures
- terms of trade vary and may be unfamiliar
- financial arrangements can be less certain
- documentation is more complicated

International trade is always difficult. If you imagine a simple transaction, where an organization buys materials in one country, and arranges for them to be delivered to another country, you can begin to see the complications. It is not just a question of sending someone to another country to pick up the materials and bring them back. Also included are international banks to arrange the finances and exchange currencies, one government's regulations on exports and another government's regulations on imports, customs clearance with duties and taxes, transport operations in both countries, some mechanism for transferring materials between transport operators and across borders, translators for documents written in different languages, lawyers to check the contracts and conditions, and so on. As you can see, there are a surprising number of people involved in even a small transaction.

As with all logistics, a vital concern is the flow of information. This is obviously more difficult at a distance, and across borders. Unfortunately, it is also more important to have efficient information systems for long international supply chains, where there are more opportunities for things to go wrong. If a delivery is delayed at a border, both the supplier and customer want to know exactly what is happening, and how to solve any problems. But if the

border is in a remote area, it can be difficult to get any information, let alone an accurate account of the situation. Intermediaries who help the flow of materials may actually cause problems with information flows. If several people are working on different aspects of movement, it may be difficult to co-ordinate their activities or assign responsibilities. Developments in mobile communications and EDI can certainly improve information flows, and some organizations are using this to get an advantage over their competitors. Other improvements come with the removal of trade barriers and harmonisation of business practices.

Problems with trade

Of course, the administrative difficulties are only one type of problem for international trade. As the European Union moved towards a single market, it identified three types of barrier:

- physical barriers, such as border controls and customer formalities
- technical barriers, such as differing health and safety standards
- fiscal barriers such as different rates of value-added tax and excise duties.

We can add some details to this list to show some of the issues for international logistics. These might appear at every border, and circumstances can change within a very short distance.

- *Political and legal systems:* The type of government and laws in different countries give significantly different conditions. Practices that are accepted in one country may be unacceptable in a neighbour. You can imagine one example from the past when Germany was divided. Simply stepping from West Germany to East Germany meant a change from a free market economy with systems aligned to western Europe (including private transport) to a centrally planned economy with systems aligned to the east (including nationalized transport).
- *Economic conditions:* Political systems directly affect the economy, and there are significant differences in prosperity, disposable income and spending habits. Sometimes there are very rapid changes, between, say, the borders of the USA and Mexico or Austria and the Czech Republic.
- *Competition:* This varies between very intense, market-driven competition in some countries, to state run monopolies in others. Logistics in, say, the Netherlands is particularly well developed and companies compete for business over a wide area.

- *Technology available:* Many logistics companies use sophisticated technologies for e-commerce, efficient customer response, satellite location, in-cab navigation, real-time routing, total communications, and a whole range of other developments. Although such technology is feasible, it does not mean that everybody uses it. Most of the world does not have access to, does not need, or cannot afford the latest technological development. In many areas the movement of loads depends on manual effort and bullock carts, and a lorry is the most advanced technology available.
- *Social systems and culture:* It is usually easier to trade with someone who has similar culture, habits, expectations, and so on. Even language differences give problems, so it would be easier for a company working in Belgium to open new facilities in France rather than, say, Sudan. You might assume that these differences are only important if dealing with widely separate locations, but there are many examples of people who live very close together, but seem to have little in common.
- *Finance:* There are many financial factors to consider. Some countries do not allow their currency to be taken out of the country, the value of some currencies fluctuates wildly or falls quickly, some banking systems are inefficient, sometimes exchanging money is difficult, and so on. A different type of problem comes with customs duties and tariffs for materials entering the country. We mention some of these in the next section.
- *Geography:* Transport is generally easier in straight lines over flat terrain. Crossing the American prairies is easy, but very few areas are laid out like this. Physical barriers that hinder transport include seas, mountain ranges, deserts, jungles, rivers, cities, national parks, and so on.

It is often the practical details that make the movement of materials across international frontiers time-consuming and irritating. You often hear of deliveries that are held up for days, simply because the driver cannot speak the same language as the customs people. Surveys typically suggest that the main problems found by exporters are as follows:

| Main Problems | Percentage of exporters |
|---|--------------------------------|
| Export documentation | 23 |
| Transportation costs | 20 |
| High import duties | 17 |
| Cannot find foreign representatives with enough knowledge | 16 |
| Delay in transfer of funds | 13 |
| Currency fluctuations | 12 |
| Language barrier | 10 |
| Difficult to service products | 10 |

Customs barriers

Conventionally, customs duty is payable whenever materials enter a country. In practice, there is more than just customs duty, and it can be quite difficult to add all the taxes and duties to calculate the amount payable. Materials entering the European Union, for example, might have to pay customs duty, excise duty, import VAT, countervailing duties, anti-dumping duty, Common Agricultural Policy levies, and compensatory interest. These tariffs are not necessarily levied at the same rates, but there can be preferential rates. As an example, the duty on a television tube entering the European Union from Malaysia is 14%, from Thailand is 9.8%, from South Africa is 7.3% and from Poland is 0%.

These are not the only costs of crossing a border, as companies have to pay the cost of compliance with export/import regulations, such as compulsory documentation and information requirements.

If materials cross a series of frontiers, they might have to pay these costs at every one. This would obviously raise prices and limit trade. As part of a policy to encourage trade, most countries do not charge duties on materials that are simply moving through, so that duty only becomes payable in the final destination. This is not always true, and sometimes charges are made on goods in transit. Normally, materials can also use customs' warehousing without paying duty. This allows normal port and warehousing operations, with duty paid when the materials are removed from the customs' warehouse and taken to their final market. This idea is extended in Free Trade Zones, which are duty- and tax-free areas within a country. These zones give larger areas for port and warehousing operations, and usually work like a

container terminal. Even larger developments of this kind form customs unions. These are areas, like the European Union, that agree not to charge duties within their borders. Duty is paid when materials enter the union – which is seen as the final market – but they can then move freely without paying any more.

Of course, not everybody is in favour of removing barriers at international borders or encouraging trade. They argue that there should be strict controls over exports and, more particularly, imports. Thus considerations like excise duty and customs charges serve the main purposes of:

- preventing goods that are considered undesirable from entering a country
- protecting domestic producers from foreign competition
- generating revenue for the host country
- collecting statistics on trade

Global supply chains

Managing the logistics of a global organisation is immensely complicated. It can involve the movement of huge quantities of materials around the world. Unfortunately, there is no single ‘best’ model for a global supply chain that can be used by every organisation. Each organization has to find its own solution. Nonetheless, we can mention some common results, and the following list shows five common models for global logistics:

- *Sell globally but concentrate production and sourcing in one area.* Logistics then has a fairly simple job of moving materials from local suppliers into the organisation, but there are more problems with distribution from operations to international customers. To some extent this model gives fairly easy logistics, as the organisation is a pure exporter with global marketing rather than global operations. This can also be the most vulnerable to external pressures, as it is seen as concentrating economic benefits in one centre.
- *Concentrate production in one centre but buy materials and components from around the world.* Materials are now collected from distant suppliers, and products sold to distant customers. This gives, perhaps, the most difficult logistics with potential problems for both inward and outward logistics. It gives more widespread economic benefits, but the main value-adding activities are still concentrated in one location.
- *‘Postponement’ moves the finishing of production down the supply chain.* In a global context, postponement typically opens limited local facilities to complete production. This gives some opportunities for local value, but all components and parts are imported from main production centres. Because of the limited local input, low added value, and

competition for local manufacturers, this kind of ‘screwdriver’ operation can be unpopular with host countries.

- *Operating as a local company, buying a significant proportion of materials from local suppliers.* The inward movement of materials is easier, as it becomes a local matter. Of course, this means that it may be vulnerable to changing local conditions. The products might be destined for local markets, or operations could be big enough to export to international customers. This is the most popular approach with host countries as it develops local skills and brings considerable economic benefit.
- *Some global operations have limited need of logistics.* A hamburger chain, for example, might work globally, but practicalities demand that it does not have an extended supply chain, but buys almost all materials locally and sells to local customers.

The features of the product and the company structure set the overall shape of a supply chain. A global company, for example, is unlikely to use the first model with centralised operations, as this is more like an ‘international’ company. There are, of course, many variations on these basic themes.

Supply Chain Security

Supply chain security is a broad term that encompasses the efforts to reduce the risk of both external and internal threats such as terrorism, piracy, and theft, both in the real world and in the cyber-space.

Physical threats to your supply chain security include more traditional means of harm, such as theft, sabotage, and piracy. These types of threats can come from both internal and external sources. For example, a cargo ship may be hijacked by pirates, this is an external threat. However physical threats can come from internal sources as well such as disgruntled employees stealing or sabotaging inventory. There are a variety of methods to combat these physical threats, including:

- Using standardized identification and credentials for supply chain participants
- Utilizing state-of-the-art track & trace technology to receive real time updates on the status of various shipments
- Employing advanced locking mechanisms on cargo as well as tamper-proof seals
- Screening employees thoroughly with a focus on values to reduce risk of internal threats
- Use standardized inspection procedures as well as mobile technology applications on cargo entering every node within a supply chain.

Once upon a time, physical supply-chain threats were all a business had to worry about. Now with the rise of the internet and increasingly software reliant systems, there are new and perhaps more insidious threats. The internet has been a massive benefit to supply chains, both small and global. However, the rise of internet-reliant supply chains has created new avenues of potential threats. A few dedicated and skilled hackers can bring down the largest of supply chains.

In today's day and age, there will always be black hat hackers looking to disrupt business and their operations. By taking the steps shown above you can improve your business's supply chain security and reduce potential risks.

Need to Encourage Foreign Investment

Of particular importance is the role of governments in deciding whether they would allow international businesses to setup their operations and encourage them to grow and succeed. Often, the governments of many countries do not have a choice but to welcome international businesses as they need the "hard cash" or the Dollars, as they are also known. For instance, the difference between exports and imports is known as the Current Account Deficit or CAD. Since many emerging markets (except China which has a positive CAD) have deficits that need to be financed with Dollars. Then, the governments can either borrow these Dollars at high rates or finance the deficit through FDI or Foreign Direct Investment and Equity flows into the stock markets from FIIs or Foreign Institutional Investors.

The Role of the Government

Apart from this, the domestic industry might not have the capabilities to succeed in a particular sector nor the expertise to develop that sector. Therefore, FDI becomes necessary for the growth of that sector. Moreover, opening up of the economy is needed for admission into the WTO or the World Trade Organization, which means that in order to export to other countries, emerging and developing market economies have to open up. These are some of the reasons why many governments in developing countries encourage foreign investment and allow international businesses to setup operations in their countries. However, whether the successive governments continue the same policies or not depends on a host of factors that include the ideological bent of the governments, the compulsions of politics, and the fact that foreign investment might not have succeeded in kick starting the economy as planned.

Logistic systems are strongly connected to trade and investment and gain growing importance to describe the competitiveness of countries in a globalized world. An increase in world trade simultaneously requires a progress in transport technologies and qualitative logistics are a necessary condition for foreign investors to operate efficiently.

UNIT – IV

INTERNATIONAL INSURANCE

Insurance

Insurance is a means of protection from financial loss. It is a form of risk management, primarily used to hedge against the risk of a contingent or uncertain loss.

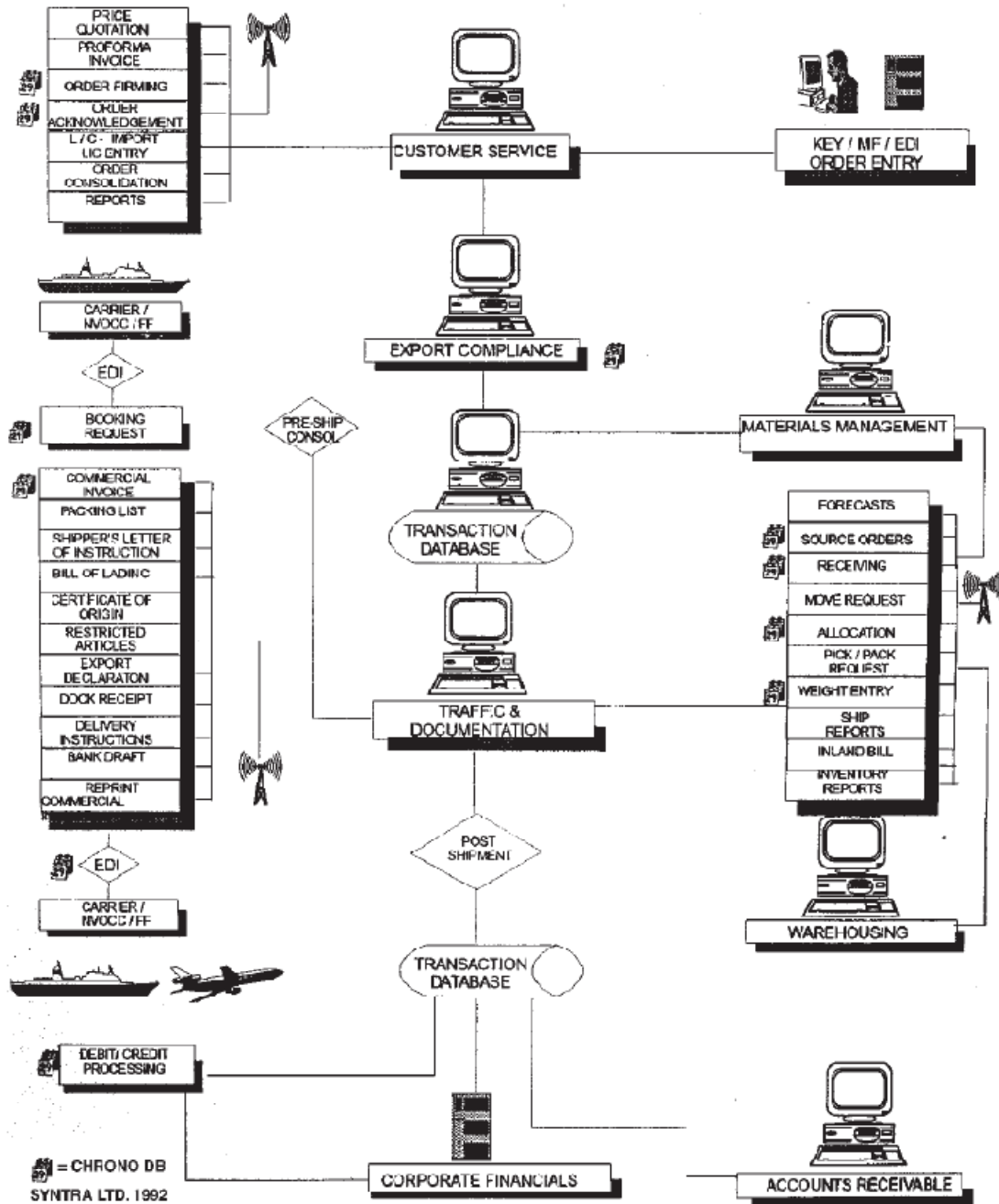
An entity which provides insurance is known as an insurer, insurance company, insurance carrier or underwriter. A person or entity who buys insurance is known as an insured or as a policyholder. The insurance transaction involves the insured assuming a guaranteed and known relatively small loss in the form of payment to the insurer in exchange for the insurer's promise to compensate the insured in the event of a covered loss. The loss may or may not be financial, but it must be reducible to financial terms, and usually involves something in which the insured has an insurable interest established by ownership, possession, or pre-existing relationship.

The insured receives a contract, called the insurance policy, which details the conditions and circumstances under which the insurer will compensate the insured. The amount of money charged by the insurer to the policyholder for the coverage set forth in the insurance policy is called the *premium*. If the insured experiences a loss which is potentially covered by the insurance policy, the insured submits a claim to the insurer for processing by a claims adjuster. The insurer may hedge its own risk by taking out reinsurance, whereby another insurance company agrees to carry some of the risks, especially if the primary insurer deems the risk too large for it to carry.

Cargo Insurance

For international shipments, one needs insurance. There are few exceptions to this rule. Under a codification of the Hague rules of 1924, an ocean carrier has an upward limit of \$500 per package. “In some jurisdictions, courts have held that a 40-foot container is the package”.

The primary purpose of insurance is to redistribute loss and so to eliminate risk. An equally important function of insurance, and one which is more economically creative, is the actual prevention of loss. One is interested in the elimination of risk and the prevention of loss. The cost of risk elimination is the insurance premium. The reason one is interested in preventing loss is that the cost of risk elimination is directly related to loss experience.



Export Logistic Systems (ELS) Data Flow

The purpose of insurance is to redistribute the loss and thereby eliminate risk. How does insurance redistribute loss? It does so by increasing the number of exposures so that loss is certain and by spreading the cost of that loss among all those exposures. Each time one pays an insurance premium he is absorbing a very small loss. One eliminates uncertainty by suffering a loss on each shipment.

People or firms who *self insure*, or buy no insurance from an outside party, apply a portion of each sale to a kitty awaiting the occurrence of a loss, which is sure to come. In this way they are spreading the cost of the loss that does occur over time and over the shipments on which a loss did not occur. All companies do this to some extent. Minor claims are not usually sent to underwriters because the administrative cost of doing so is prohibitive.

The amount of self insurance, per loss transaction, may also be referred to as the *deductible*. Deductibles are a part of the cost of doing business. Over and above deductibles, most companies purchase marine insurance from specialized insurance carriers.

Marine Cargo Insurance

Marine cargo insurance is a class of property insurance that insures property while in transit against loss or damage arising from perils associated with the navigation of the sea or air and subsequent land and inland waterways.

Mainly, there are three basic sets of institute cargo clauses; A, B, C. Your coverage is directly related to your insurance premium. It means, the higher the marine insurance premium you pay; the more would be coverage you get. Here are the three institute cargo clauses as detailed below:

- *Institute Cargo Clause A*: It is considered to be one of the widest marine insurance coverages and therefore, you should be ready to pay the high premium for this as you would be getting the extensive cover.
- *Institute Cargo Clause B*: It is considered to be slightly a restrictive cover and therefore, the premium is moderate. The policyholder mainly asks for the coverage for some more valuable items or only a partial cargo.
- *Institute Cargo Clause C*: It is the most restrictive coverage, and you should be ready to pay the low premium. However, as the premium would be low, your coverage would also be less.

Each of the institute cargo clauses mentioned above is restricted to goods which are in transit. The items being shipped would be considered the goods in transit only if they have left from the original location and are still in transit to the destination.

In any case, the above cargo clauses will not offer coverage in the following situations

- Loss or damage happens due to willful misconduct of the policyholder
- Loss or damage happen due to insufficiency or unsuitability of packaging
- Loss or damage happen due to delay
- Loss or damage happen due to insolvency or financial default of the operators of the vessel

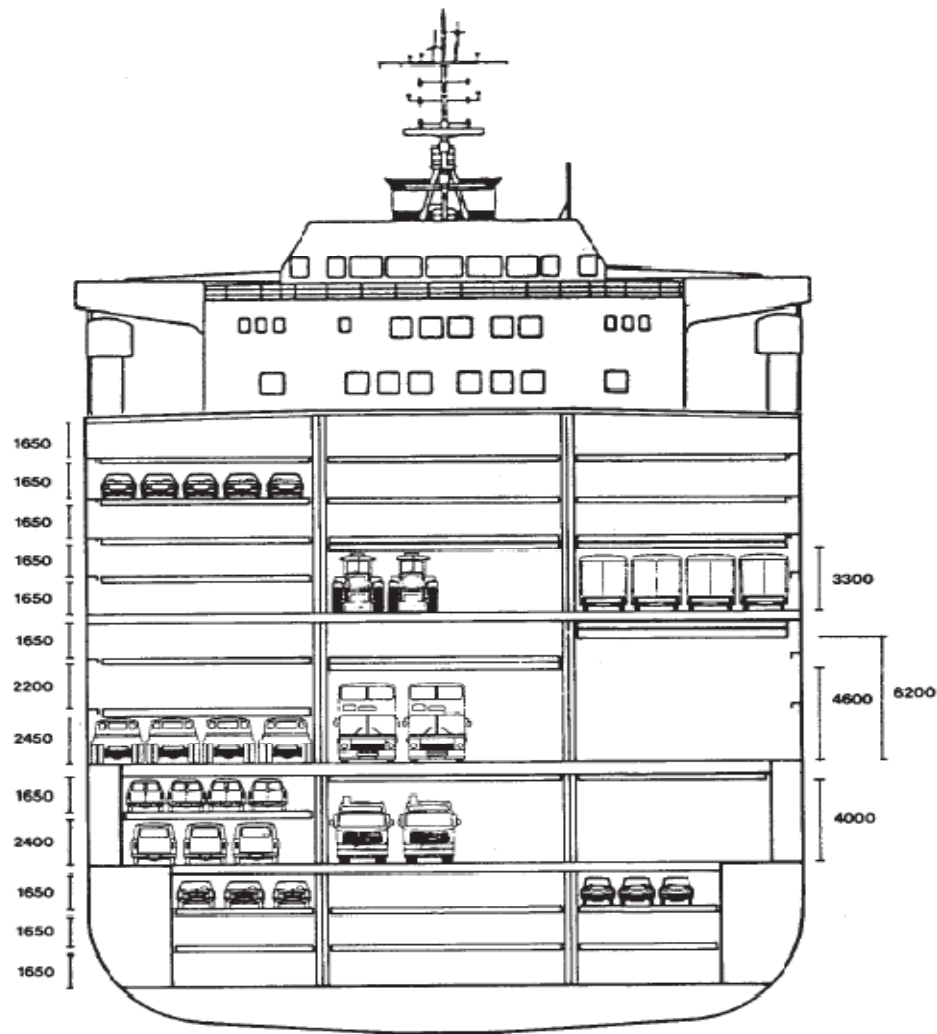
- Loss or damage or expenses directly or indirectly arise due to nuclear fission, atomic activity, etc.

Size of the Vessels

It is difficult to construct categories into which one can carefully classify all cargoes. Bulk cargo, for example, is carried on liner vessels that are scheduled to sail, but have not been able to fill up with more lucrative cargo. The term “topping off” is used, and a common cargo for this purpose is baled hay. The rate per ton charged for that haul is close to that paid for moving hay by the vessel load. At the other extreme, a vessel might be loaded with a bulk cargo and would take on a partial load of oversize cargo that would ride on top of the deck. This is known as “deck” cargo. A common example is school buses or rail transit vehicles.

Another term that has come into use describing cargo is *project* cargo. That is not a specific type of item but related cargo needed for a single, certain purpose. Hence, if a contractor were rebuilding a structure in Kuwait or a portion of a major pipeline, the various materials that were to be obtained from outside the local area would be scheduled, purchased, consolidated at various ports, and shipped as needed. Often, project cargo is spread out over a number of voyages. Sometimes, project cargo is oversized and requires special transportation equipment and handling on both land and sea.

The following figure shows the front of a cross-section of an auto-carrying ship, the deck levels of which can be adjusted. Autos and logs also move as break-bulk or containerized cargo. There are special auto-rack containers that can be contorted into different shapes to accommodate batches of autos with varying dimensions.



Cross-section of an auto-carrying vessel

Types of Vessels

- Tankers (oil)
- LNG (Liquefied Natural Gas) Carriers
- Ore and Bulk Carriers (dry-bulk carriers)
- Combination (Oil and Dry-Bulk) Carriers
- General Cargo Vessels
- Neo-bulk Carriers (high value cargo)
- Combined Passenger/Cargo Ships
- Refrigerated carriers (reefers)
- Roll on–roll off, or “Ro/Ro” vessels

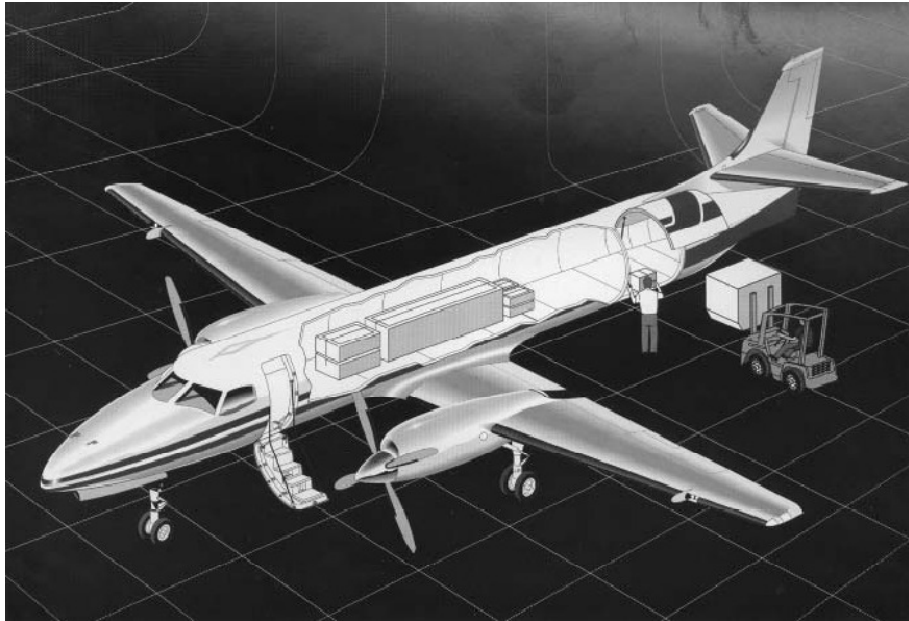
UNIT – V
INTERNATIONAL AIR TRANSPORTATION

It emphasizes movements of cargo, rather than passengers. It is difficult to separate the two since considerable freight moves on aircraft that also carry passengers. A very small percentage of the world's commercial airline aircraft carry cargo exclusively. Airlines that carry both passengers and cargo give higher priority to the movement of passengers, and flights are scheduled to capture passenger markets. In terms of value, air cargo is very important.

Some supply chain managers also have responsibilities for moving people throughout the world. In some instances, this merely means providing them with airline tickets; in other instances, contracts may be entered into with airlines for movements of groups of people. Firms with large volumes of travel may have outside travel agencies assign certain personnel to serve their specific needs only, or the firm may have its own travel agency as a subsidiary, earning for itself the commissions on ticket and accommodation sales.

Some airlines specialize in carrying small parcels and documents, and several well-known overnight document/package delivery companies in the United States are expanding their operations overseas. Speedy international delivery of documents is important to many export/import operations, since all documents relevant to a shipment must be present at its point of importation. Air transport is often relied upon to make certain the documents are present when the vessel arrives in port (although, eventually, many of these documents will be transmitted electronically).

Not all cargo is flown on jets. The Hercules, a Lockheed-built freighter powered by four turboprop engines, is widely used in many charter operations, and some versions are used by the military. The plane can carry about 25 tons and flies at 325 mph. It can operate in and out of rougher airstrips than can most airline-type aircraft. Other propeller-driven freighters can be spotted throughout the world. Most of these planes were converted from passenger configurations. The following figure shows a twin-engine propeller freighter used by Merlin Express to carry cargo in the U.S., Canada, and Mexico.



Propeller-driven freighter

In the 1970s, a number of U.S. passenger airlines operated all-cargo aircraft but – with one exception—they gradually disposed of them. One reason was that the new jumbo jets had so much belly cargo capacity that they could meet the needs of most markets. The problem was that passengers like to fly during the day, while shippers of freight like to have it move by night, so some large U.S. forwarders began operating their own all-freight aircraft. Foreign passenger/cargo airlines still fly all-cargo craft. One of Lufthansa’s all-cargo 747s is shown in the following figure.





Heavy lift cargo airlines

Air cargo Regulations

Regulations and policies affect every movement in the air cargo system. These regulations and policies can create challenges and risks for airports, and affect air cargo market performance and future development. In order to prepare for these changes, airports need to learn the current and upcoming regulations for air cargo operations. Security, safety, and environmental regulatory changes have the potential to impact air cargo operations.

Intermodal Transport

We have seen some factors that affect the choice of transport mode, but organisations do not have to use the same mode for an entire journey. Their best option is often to divide the journey into stages and use the best mode for each stage. This does, of course, depend on factors like the length of the journey, the relative costs and the penalty of moving between modes. But if you move materials from, say, Lanchow in central China to Warsaw in Poland, you might start by putting the goods on a truck, transferring them to rail for the journey across China to Shanghai, then onto a ship to Rotterdam, then back onto rail to cross Europe,

and then truck for local delivery. Journeys that use several modes of transport are called **intermodal**.

Intermodal Transport refers to journeys that involve two or more different modes of transport.

The aim of intermodal transport is to combine the benefits of several separate modes, but avoid the disadvantages of each; perhaps combining the low cost of shipping with the flexibility of road, or getting the speed of air with the cost of road. The main problem is that each transfer between modes causes delays and adds costs for extra handling. You can experience this effect when you transfer between a bus and train, or between a car and ferry. Intermodal transport only works if this transfer can be done efficiently.

At the heart of intermodal transport are the systems for transferring materials between modes. The aim is to give a virtually seamless journey, and the best way of achieving this is to use modular or unitised loads. In effect, all materials are put into standard containers, and the equipment is arranged to move these containers.

The basic container is a metal box 20-feet long. This size has become somewhat restricting, and it is often replaced by a 40-foot box. Even this can be limiting, and the Hudson's Bay Company uses 53-foot containers on the trip from Vancouver to Montreal, reducing costs by 10–15%.

Putting materials into these boxes eliminates the need to handle items individually, and the whole container goes from source to destination. Since these containers were introduced in 1956 on the trip between New York and Houston, they have transformed ideas about transport.

In particular, transferring materials between modes has changed from a labour-intensive operation to a capital-intensive one. Huge **container ports** and **terminals** have been built around the world to move containers efficiently and with minimum delay from one type of transport to another, or from one carrier to another.

In the late 1960s ships spent about 60% of their time laid up in port for loading and unloading. Largely due to containerisation, this has reduced dramatically, and ships can turn around in a few hours. A rule of thumb is that it takes one day to turn around a containership when it used to take three weeks to turn around a conventional ship. Over 70% of freight movements now use containers.

Some of the benefits of containerisation include:

- Simplified transport and flow of goods
- Easier and faster handling
- Genuine door-to-door service
- Faster deliveries
- Reduced loss due to damage, misplacement and pilferage
- Reduced packing costs
- Lower insurance costs
- Separation of incompatible goods
- Use of less congested routes
- Improved transport encourages trade.

Other types of intermodal transport

A very wide range of materials can be put into containers, but there are inevitably some that cannot, or are cheaper to transport by other means. Oil, for example, might be put into container-sized tanks (in the same way as bulk wine), but tankers or pipelines give cheaper alternatives. Non-standard containers might also be preferred for some journeys. Standard containers have to be strong enough to stack about eight tall, but if a company simply wants to transfer a box from rail to road, it can use 'swap bodies'. These are skeleton truck bodies that can be transferred to a rail car, but cannot stand the rough treatment of containers.

Another alternative to containers is **piggy-back transport**, where a lorry – or usually just the trailer – is driven onto a train for fast movement over a longer distance. You can see an example of this in the Channel Tunnel, where cars and lorries are driven onto a train for this part of their journey.

Another extension to this idea uses **land bridges**. These are used when materials cross land on what is essentially a sea journey. The most widely used examples are in the USA, where materials from the Far East cross the Pacific to the west coast of America, and then travel by rail on land bridges across to ports on the east coast, before continuing their sea journey to Europe. Two main links are the 'long bridge' in the north between Seattle and Baltimore, and the 'short bridge' in the south between Long Beach and New Orleans.

Packing objectives

A good logistics packaging keeps products safe and ensures that your product arrives at their address in the perfect form and free from any damage. A distributor requires a lot of

information about the product. And a transportation packaging is a suitable position to display the same. The following are the goals of packing in logistics.

- Increasing Efficiency.
- Rapid Response.
- Fewer Unexpected Events.
- Minimum Inventory.
- Reduced Transportation and Logistics Cost.
- Quality Improvement.

Times Cargo Limited

TCL Logistics was established in 1997 in response to the growing popularity of standardized shipping platform programs, namely in regard to CPC and CHEP pallets in the food and beverage production industry. Companies were facing ever-increasing costs and were looking for third party expertise to help them solve these complex logistical challenges. With that goal in mind TCL Logistics quickly established itself as a leading expert in pallet management and retrieval.

Since then we have grown steadily and now enjoy the confidence of dozens of long-term customers, ranging from small regional companies to large multi-national firms. We enjoy a strong and positive reputation because each program we implement is designed specifically for the individual customer whether they operate from a single location or from multiple shipping points. Our clients include manufacturers, brokers, third-party warehouses, transport companies, and other logistics providers.

TCL Logistics offers services to companies both big and small in the area of pallet program management and control, tracking and return of totes and other reusable containers, and consulting services on all aspects of container management. These services run from one-time consulting programs to full tracking, management and recovery programs.

Lakshmi Cargo Company

Lakshmi Cargo Company (LCC), a division of Chakradhara Aerospace and Cargo Private Limited is a renowned logistics solutions provider that handles a range of services including Freight Forwarding, Parcel Services, Third Party Logistics, Customs Broker, Clearing and Forwarding, Courier Services and much more.

Based out of Coimbatore, a place better known for its engineering industries and the spirit of entrepreneurship, LCC, is a division of Chakradhara Aerospace and Cargo Private Limited (CACPL). CACPL is related to Lakshmi Machine Works Limited (LMW) which is a

diverse business group with interests in Textile Machinery, Machine Tools, Foundry Castings, Aerospace components etc.,

We at LCC endeavor to meet our customer's requirement by providing quality services with the motto of on-time, every time.

We strive to further our relationship with our customers by developing dedicated and customized resources for them to ensure that delivery and quality focus is maintained at all costs.

Lakshmi Cargo Company (LCC) is a renowned logistics started its operations in the year 1985 and became a Public Limited Company in the year 1991.

As an ISO 9001-2015 certified company, LCC has been continually gaining a worldwide network of agents for its dedicated clientele to ensure reliable service.

- Customs broker
- Freight forwarding
- Parcel Services
- 3PL (3rd Party Logistics)
- Transport
- Courier

Customs duty

Customs Duty is a tax imposed on imports and exports of goods. The rates of customs duties are either specific or on ad valorem basis, that is, it is based on the value of goods. Rule 3(i) of the Customs Valuation (Determination of Value of Imported Goods) Rules, 2007 states that the value of imported goods shall be the transaction value adjusted in accordance with the provisions of its Rule 10.

Import duties are generally of the following types: 1. Basic duty; 2. Additional Customs duty; 3. True Countervailing duty or additional duty of customs; 4. Anti dumping duty/Safeguard duty.

While revenue is a paramount consideration, Customs duties may also be levied to protect the domestic industry from foreign competition.

Non-tariff barriers

A non-tariff barrier is any measure, other than a customs tariff, that acts as a barrier to international trade. These include: regulations: Any rules which dictate how a product can be manufactured, handled, or advertised. rules of origin: Rules which require proof of which country goods were produced in.

Customs cleaning process

Customs clearance is a necessary procedure before goods can be imported or exported internationally. If a shipment is cleared, then the shipper will provide documentation confirming customs duties that are paid and the shipment can be processed.

International logistics infrastructure

Logistical infrastructure is the backbone of logistics systems. Apart from the transport infrastructure, the suprastructure including the logistics locations and real estate as well as the telecommunication infrastructure are becoming increasingly important for logistics.

With this in mind, there are four important **elements of international logistics** that are critical to cargo movements: 1) Integrity, 2) Pedigree, 3) Chain of Custody, and 4) Track and Trace.