МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ
«БРЕСТСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ ПО ЭКОНОМИЧЕСКИМ
СПЕЦИАЛЬНОСТЯМ

Introduction to Logistics

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Основная цель пособия – подготовить студентов к использованию английского языка в их будущей профессиональной деятельности. Пособие направлено на обучение студентов овладению лексикой, используемой в сфере логистических операций, формирование навыков говорения, чтения и письма, а также содержит дополнительные тексты для организации самостоятельной работы студентов.

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Unit 1. The Context of Logistics

Text 1. Logistics and Supporting Operations

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Logistics, manufacturer, supplier, customer; deliver, storage, dairy, shopping mall, intangible, warranty, insurance, input, chef.

Ex. 2. *Read the text and do the tasks that follow.*

All organizations 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, 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 them 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 booklet you will get a more detailed look at this complex function. We are going to discuss these issues and developments, and see how managers can get the best results from their logistics.

Every organization delivers products to its customers. Traditionally we describe 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).

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.

At the heart of an organization are the operations that create and deliver the products. These operations take a variety of inputs and convert them into desired outputs. 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.

The products created by an organization are passed to its customers, making the cycle. This shows customers' generating demands, with operations using resources to make products that satisfy them. Logistics moves materials around this cycle. 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 organization, collecting from internal suppliers and delivering to internal customers. This leads to our basic definition:

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

Understanding the main points.

Ex. 3. *Scan the text to find the English equivalents to the following collocations.*

Доставлять продукты, материальные товары, сложный пакет, производить легковые автомобили, послепродажное обслуживание, бытовые приборы, превращать в желаемую продукцию, приготовление пищи, приемный покой, операционная, отечественные потребители, движение материалов.

Ex. 4. *Answer the questions.*

1. What functions does logistics perform? 2. Logistics involves a great mount of effort, doesn't it? 3. What countries represent the world's largest economies? 4. What is their combined GDP? 5. What are the visible signs of logistics? 6. In what terms are products usually described? 7. To your mind, is this view misleading? 8. What is the other division of products? 9. What kind of operations make the core of any organization? 10. What do inputs include? Give examples. 11. What is a product cycle? 12. What is logistics in terms of a product cycle?

Ex. 5. *Match the words with their definitions.*

1. supplier — a) the act of keeping or putting something in a place while it is not being used, or the lace used for this

2. customer	b) an area just outside a city or town where there are small factories and businesses
3. gross domestic product	c) a person who buys goods, products, and services for their own use, not for business use or resell
4. manager	d) a company that provides a particular type of product
5. shopping mall	e) things that are produced in order to be used or sold
6. storage	f) the growth or improvement in something, so that it becomes bigger or more advanced
7. consumer	g) a person or organization that buys goods or services from a shop or company
8. retail shop	h) someone whose job is to manage all or part of a company or organization, or a particular activity
9. goods	i) the sale of goods to customers for their own use, rather than to shops
10. trading estate	j) a large area where there are lots of shops, usually a covered area where cars cannot go
11. development	k) the total value of goods and services produced in a country's economy, not including income from abroad

Ex. 6. *Expand on the following statements from the text.*

1. Traditionally products are described as goods and services. 2. The idea of dividing all products into either goods or services is rather misleading. 3. Any organization's work is centred on creating and delivering products. 4. The products created by an organization are passed to its customers. 5. Logistics moves material through the different parts of an organization.

Ex. 7. *Work in pairs. Speak about logistics and its supporting operations using the following* procedure.

- Before you speak, plan what you are going to say and select words and phrases you have studied so far in this text.
- Speak for about a minute.
- When you are listening to your partner's talk, think of questions to ask at the end of it.

Interesting to know

Самые известные музеи логистики

Музей логистики (Museum of Logistics), Токио, Япония. Музей открыт в 1998 году. Он унаследовал коллекцию музея «Ниппон Экспресс»: более 12 000 статей о транспортировке и 40 000 документальных изображений, отражающих историю фирмы «Ниппон Экспресс». История материально-технического снабжения Японии отображена на втором этаже, а на третьем располагаются читальный зал и комната мультимедиа.

Музей королевского логистического корпуса (The Royal Logistics Corps Museum), Суррей, Великобритания. Экспозиция музея рассказывает о

материально-технической поддержке британской армии со времен Оливера Кромвеля до наших дней. Посетители музея узнают, как на протяжении последних 500 лет солдат британской армии транспортировали, кормили, снабжали оружием и снаряжением и как солдаты поддерживали связь с друзьями и близкими.

Музей логистики вооруженных сил Канады (The Canadian Forces Logistics Museum), Монреаль, Канада. В музее представлены более 10 000 экспонатов, относящихся к истории Канадского королевского корпуса материального снабжения и его приемника – Логистического подразделения вооруженных сил Канады. Экспозицию музея дополняет крупнейшая коллекция канадской военной техники и артиллерии канадской провинции Квебек.

Text 2. Aims of Logistics

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Supply chain, semantics, convention, exactly, distribution, morale, merchandising, manager, efficiently, productivity, inbound, outbound, warehouse, consumables, tangible, intangible, circumstance, courteously, consumables, value, security, grease, shareholder, survive.

Ex. 2. *Read the text and do the tasks that follow.*

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 organization, while supply chain management takes a broader view of movement through related organizations. This is, however, largely an argument over semantics rather than real differences in practice. In this booklet 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 '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 organization 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 organization 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 organizations really need a more positive approach to co-operation. This will be discussed in a more detailed way in the next units. Here, though, we look at the more immediate aims of logistics within an individual organization.

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 worth-while 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 an organization.

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

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 organizations 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 organization moves to create its products. These materials can be both tangible (e.g. raw materials) and intangible (e.g. information).*

Ultimately, the success of every organization 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 organizations 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 organize the movement of materials in the best way to achieve high customer satisfaction.

Any organization 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 summarize 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 of this. The first is concerned with planning, when managers take a strategic view and design the best possible supply chain for their circumstances. The second concern is about execution, when materials move through this chain as efficiently as possible. Harrington summarizes 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'.

Ex. 3. *Answer the questions.*

1. What is the logistics function? 2. What does its narrower definition imply? 3. What definitions of logistics and supply chain does the Institute of Logistics and Transport suggest? 4. What does 'distribution management' mean? 5. What two main aims do logistics managers have? 6. What are the immediate aims of logistics within an organization? 7. What does the success of every organization depend on? 8. Under what condition can an organization provide an outstanding customer service?

Ex. 4. *Expand on the following statements from the text.*

1. Logistics is responsible for the flow of materials through a supply chain. 2. One has to be careful what terms to use in relation to logistics. 3. Logistics managers have two main objectives. 4. Managers aim at more efficient movement of

materials. 5. The success of any company depends on customer satisfaction. 6. Allocating enough resources is the key to any organization's customer service.

Ex. 5. *Work in pairs. Describe the aims of logistics. Give examples to support your point of view.*

Interesting to know

Слоны и логистика

Слоны живут на земле уже 40 млн лет. В настоящее время Всемирный фонд природы прилагает много усилий для защиты и сохранения в Азии и Африке слонов, жизнь которых, без сомнения, находится под угрозой. Не везде слонам хватает пищи, так как в день им требуется 150-300 кг еды.

Слоны помогали человеку осваивать труднопроходимые тропические заросли. Многокилометровые тропы, проложенные ими в джунглях, часто так широки, что по ним можно проехать на вездеходе. Эти тропы человек впоследствии использовал для строительства дорог. Дело в том, что тропы слонов повторяют ярко выраженные рельефы местности и проходят, насколько это возможно, на определенной высоте над уровнем моря, т.е. слоны всегда выбирают самые рациональные и экономичные пути. Поэтому слонов можно назвать асами в области логистики.

Text 3. Importance of Logistics

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Essential, ultimately, point of origin, expensive, overheads, costs, disagreement, precise, expenditure, gravel, jewellery, rule of thumb, turnover, interpret, wholesale, account for.

Ex. 2. *Read the text and do the tasks that follow.*

Logistics is essential for every organization. M. Christopher says that 'Logistics has always been a central and essential feature of all economic activity'. R.D. Shapiro and J.L. Heskett agree, saying that 'There are few aspects of human activity that do not ultimately depend on the flow of goods from point of origin to point of consumption'. Without logistics no materials move, no operations can be done, no products are delivered, and no customers are served.

Not only is logistics essential, but it is also expensive. Organizations may reduce their overheads as much as possible, but they are often left with surprisingly high logistics costs. Unfortunately, it is difficult to put a figure to these, and there is a good deal of uncertainty in the area. Normal accounting conventions do not separate expenditure on logistics from other operating costs, and there is some disagreement about the activities to include. As a result, very few organizations can put a precise figure on their logistics expenditure, and many have almost no idea of the costs.

The cost of logistics varies widely between different industries. Building materials, such as sand and gravel, have very high logistics costs compared with, say, jewellery, pharmaceuticals and cosmetics. However, one rule of thumb suggests that logistics costs are 15-20 per cent of turnover. The USA has a GDP of $10 trillion, so it might spend $1-2 trillion dollars a year on logistics, with half of this spent on transport. You have to interpret such figures carefully as other studies give different views. The UK government, for example, says that 12 per cent of the GDP comes from wholesale and retail trades and 6 per cent comes from transport and storage. These figures suggest that overall logistics costs are considerably higher – perhaps supporting an earlier estimate by A. Childerley that logistics accounted for 32.5 per cent of the UK GDP.

Despite the differences in these figures, everyone agrees that logistics can be very expensive. Whether it is getting more expensive is open to debate. Some people say that fuel, land, safety, environmental protection and employee costs are all rising and making logistics more expensive. They argue that this is a long-term trend that will inevitably continue. An opposing view says that improvements in logistics are more than compensating for price rises, and the overall cost is falling. By improving methods and replacing outdated practices, logistics costs continue to fall as a proportion of product value. The true picture depends on circumstances within each organization.

Despite its obvious importance, logistics has not always received its fair share of attention. Historically, organizations put all their effort into making products and gave little thought to the associated movement of materials. Managers recognized that transport and storage were needed, but they were viewed as technical issues that were not worth much attention – they were simply the unavoidable costs of doing business. Some early work in the 1920s began to look more carefully at the transport of finished goods. In 1962, though, P. Drucker could still describe logistics as 'the economy's 'dark continent' and say that this formed 'the most sadly neglected, most promising area of ... business'. Since then there have been considerable changes.

Perhaps the main reason for change was the recognition that logistics was expensive. By the 1970s and 80s surveys were suggesting that the movement and storage of materials typically accounted for 15-20 per cent of revenue. It is difficult to get accurate figures for this, and in 1994 G.V. Hill could still say that 'many distributors are unaware of the costs of the distribution service they provide'. However, logistics had been identified as a high cost function and one where organizations can make significant savings.

Ex. 3. *Scan the text searching for the English equivalents of the following collocations.*

Существенная черта, человеческая деятельность, в конечном итоге, потребление, обслуживать клиентов, снижать накладные расходы, логистические издержки, отделять, бухгалтерские условности, рабочие издержки, не иметь представления, варьировать, тратить, розничная торговля, хранение на складе, смета.

Ex. 4. *Answer the questions.*

1. How do A. Christopher, R.D. Shapiro and J.L. Heskett define the importance of logistics? 2. Logistics isn't of great importance only, is it? 3. Does the reduction in overheads always lead to reducing costs? 4. Can all organizations give the exact figure of their expenditure? 5. In what industries are logistics costs high? 6. What is mean percentage of logistics costs? 7. What amount of money is spent on logistics in the USA and UK?

Ex. 5. *Expand on the following statements from the text.*

1. Logistics is essential for any organization. 2. Logistics is not only essential but expensive, too. 3. The cost of logistics varies significantly between different industries. 4. Logistics costs make 15–20 % of turnover.

Ex. 6. *Discuss the importance of logistics in pairs. Follow the usual procedure of preparing your utterance.*

Interesting to know

Самый длинный рейс

Долгие годы это звание удерживал рейс Сингапур – Нью-Йорк, запущенный 29 июня 2004 года. Беспересадочный полет длился целую вечность – 19 часов, за это время самолет преодолевал расстояние в 15 345 километров! Специально для этого рейса «Сингапурские авиалинии» закупили четыре гигантских суперлайнера Airbus A340, оборудовав их исключительно под бизнес-класс. Первоначально компания смогла заработать на рейсах неплохие деньги и получила известность как оператора «самого длинного перелета в мире». Но вскоре авиационное топливо подорожало почти на 30%, что сделало обслуживание A340 весьма накладным. При этом спрос на билеты премиум-класса из Азии в Америку напротив значительно упал. В январе 2013 года «Сингапурские авиалинии» объявили о прекращении перевозок по данному маршруту.

В настоящее время самым длинным, а по совместительству и долгим маршрутом в мире является рейс Сингапур – Лос-Анджелес. 14 114 километров и 18 часов полета – испытание не для слабонервных!

Text 4. Organizing Logistics

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Forklift trucks, pallet, amount, procurement, destination, keep sth safe, truck, perform, arrangement, medium sized, employ, transport fleet, marketing, purchase, stock control, spread, contract, third-party, current trend, human resources, variation, common, overall function.

Ex. 2. Read the text and do the tasks that follow.

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 organization. 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 organization, and it obviously comes in a huge number of different forms. The activities can be arranged in many ways within an organization, and there is certainly no single 'best' arrangement. A small organization might have one person looking after everything. A medium sized organization 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 organized 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 organization; sometimes they are contracted out to third-party suppliers.

The current trend is towards an organization 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. There are many variations on this, with a common one found in companies organized around products or projects. Then some logistics might exist in each division, with a matrix structure allowing co-ordination of the overall function.

Ex. 3. Scan the text searching for the English equivalents of the following collocations.

Составлять, автопогрузчик, применять, удивительно, поддон, отправляться в турне, большое количество, размещать офис, доставлять информацию, исполнять, нематериальный, страховая компания, многими способами, большой транспортный парк, предоставлять отчет.

Ex. 4. Answer the questions.

1. Do organizations follow the same principles of organizing logistics activities? 2. Do the same principles apply to services as well? 3. Logistics comes in a huge number of different forms, doesn't it? 4. Is there any single 'best' logistics arrangement? 5. What is the current trend of organizing logistics activities?

Ex. 5. Expand on the following statements from the text.

1. The activities that make up an organization's logistics apply in any other organization. 2. Logistics comes in a huge number of different forms. 3. In current conditions logistics is a single integrated function.

Ex. 6. Work in pairs. Describe an organization's logistics organizing activities.

Interesting to know

Панамский канал

Строительство Панамского канала стало одной из важнейших вех в мореплавании. Введенный в эксплуатацию в 1920 году (первое судно прошло по нему в 1914, но из-за схода оползня осенью того года, официальное движение было открыто лишь шестью годами позже), канал в несколько раз сократил путь между портами Тихого и Атлантического океанов. Прежде, чтобы попасть из одного океана в другой, судам нужно было огибать Южную Америку аж вокруг мыса Горн. Сегодня Панамский канал — один из главных мировых морских путей, через который ежегодно проходит около 18 тысяч судов (нынешняя пропускная способность канала – 48 судов в сутки), что составляет значительную часть мирового грузооборота.

Text 5. Effects on Financial Performance

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Impact, financial performance, return on assets, earn, profit, measure, property, improve, amount of stock, fixed assets, lower (v.), borrow, resources, attractive, available, facilities, premium prices, increase profits, consequently, lead times,

Ex. 2. Read the text and do the tasks that follow.

As an expensive function, logistics has an impact on an organization's overall financial performance. We can give many illustrations of this, but will start with the effects on the return on assets (ROA).

The return on assets is defined as the pre-tax profit earned by an organization divided by the value of the assets employed. It can be computed as

$$\text{ROA} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

This gives a measure of how well available resources are used and, in general, the higher the value, the better the organization's performance. Assets are usually described as current (cash, accounts receivable, stocks, and so on) or fixed (property, plant, equipment, and so on). Improving the flow of materials reduces the amount of stock. This clearly lowers current assets, but we can argue that it also reduces fixed assets and increases profit.

◊ *Current assets.* More efficient logistics reduces the current assets through lower stock levels. Reducing the investment in stock can also free up cash for other more productive purposes and reduce the need for borrowing.

◊ *Fixed assets.* Fixed assets include property, plant and equipment. Logistics is a heavy user of these resources, and the warehouses, transport fleets, materials handling equipment and other facilities needed to move materials through the supply chain form a major part of fixed assets.

◊ *Sales.* By making a more attractive product, or making it more readily available, logistics can increase sales and give higher market share.

◊ *Profit margin.* More efficient logistics gives lower operating costs, and this in turn leads to higher profit margins.

◊ *Price.* Logistics can improve the perceived value of products – perhaps making them more easily available, giving faster delivery or shortening lead times. More attractive products can get premium prices.

As you can see, the first two points give lower assets, while the last three increase profits. All of these effects raise ROA, and consequently affect other measures of performance, such as share price, return on investment, borrowing, and so on.

Ex. 3. *Match the words with their definitions.*

1) impact	a) the way sb deals with or treats a situation, a person, an animal, etc.
2) resources	b) sth that you can get, buy or find
3) available	c) taking and using sth that belongs to sb else, and returning it to them at a later time
4) performance	d) a supply of goods that is available for sale in a shop/store
5) facilities	e) a thing or things that are owned by sb
6) stock	f) the money that you make in business or by selling things, especially after paying the costs involved
7) handling	g) a supply of sth that a country, an organization, or a person has and can use, especially to increase their wealth
8) borrowing	h) the powerful effect that sth has on sb/sth
9) profit	i) to become or to make sth greater in amount, number, value, etc.
10) increase	j) the part that is not included into the main part of a group or situation
11) property	k) buildings, services, equipment, etc. that are provided for a particular purpose
12) margin	l) how well or badly sth works

Ex. 4. *Answer the questions.*

1. Logistics affects an organization's overall financial performance, doesn't it?. 2. How is 'return on assets' defined? 3. What does this index show? 3. What kind of

assets do you know? Give examples. 4. What do current and fixed assets lead to? 5. How do all these five points affect ROA?

Ex. 5. *Work in pairs. Describe logistics effects on enterprises' financial performance.*

Interesting to know

Интересные логистические факты

Для логистики, транспорт – это движение товара средствами и конечно же людьми из точки А к точке В по воздуху, морю, железной дороге, трассе. Без этого процесса наш современный ритм жизни не был бы таковым. И чтобы все было доставлено в неиспорченном первоначальном виде, работники этой сферы серьезно заботятся о Ваших грузах. Так, например, в Японии все мелкие грузы перевозят в емкостях наполненных нежнейшей рисовой шелухой. Сложно представить добычу этого сырья. Но это не самая большая забота, проявленная по отношению к товарам. В США сделаны 600 специальных железнодорожных грузовых путей протяженностью более 173 000 миль (Мексика, США и Канада). По этим рельсам отправляют 70% произведенных Северной Америкой автомобилей. Общий объем дохода равен $42 млрд. в год. А первое место среди продуктов питания занимает замороженный картофель, его 95% от общего объема перевозок. А если смотреть на всю логистику в мире, и собрать цепочку всех перевозимых колбас, то длина превысит 400 000 км. Это расстояние от Земли до Луны и немного обратно.

Text 6. Pressures to Improve Logistics

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Savings, encourage, pressure, knowledgeable, quality, fierce, competition, remain competitive, opportunity, customization, growth, improvement, offer, pollution, congestion on roads, concern, environmental, privatization, deregulation, fluctuate, exchange rate, respond.

Ex.2. *Read the text and do the tasks that follow.*

As well as potential savings, many other factors are encouraging organizations to improve the management of their supply chains. The following list suggests some of these pressures:

◊ Customers are more knowledgeable, and demand higher quality, lower costs and better service.

◊ Competition is getting fiercer, and organizations must look at every opportunity to remain competitive.

◊ There is changing power in the supply chain. Very large retail chains, such as Wal-Mart, Tesco, Toys-R-Us and McDonald's, demand customized logistics from their suppliers.

◊ Other changes in retail markets include the growth of 24-hour opening, home deliveries, out-of-town malls, retail parks, telephone and on-line shopping.

◊ International trade continues to grow. This is encouraged by free trade areas such as the European Union and North American Free Trade Area.

◊ Organizations are introducing new types of operation, such as just-in-time, lean operations, time compression, flexible manufacturing, mass customization, virtual operations, and so on.

◊ Some organizations are turning from a product focus (where they concentrate on the end products) to a process focus (where they concentrate on the way products are made). This encourages improvement to operations, including logistics.

◊ There have been considerable improvements in communication. These allow electronic data interchange (EDI), item coding, electronic fund transfer (EFT), e-commerce, shared knowledge systems, and other new practices.

◊ Organizations are outsourcing peripheral activities and concentrating on their core operations. Logistics is a useful area for third-party operators, with specialized companies offering a range of services.

◊ Organizations are increasing co-operation through alliances, partnerships, and other arrangements. This integration is important for logistics, which is usually the main link between organizations in a supply chain.

◊ Managers are recognizing the strategic importance of the supply chain.

◊ Attitudes towards transport are changing, because of increased congestion on roads, concerns about air quality and pollution, broader environmental issues, government policies for the real cost of road transport, privatization of rail services, deregulation of transport, and a host of other changes.

This is, of course, only a partial list and there are many other pressures for change, including uncertain market conditions, political change, deregulation of business, rising costs, shortage of skilled staff, fluctuating exchange rates, and so on. In the next section, we will see how logistics is responding to these pressures.

Ex. 3. Answer the questions.

1. Are there are any factors that encourage improvement in supply chain? 2. What do customers demand? 3. What encourages internal trade? 4. What other changes in retail markets occur? 5. What improvements in communication do we witness now? 6. What are the attitudes to import determined by? 7. How do companies increase their cooperation? 8. What other pressures can you add to the list which may help improve logistics?

Ex. 4. Work in pairs. Speak on the pressures that may help improve an organization's logistics.

Interesting to know

Берегитесь паллет - это очень опасно для здоровья!

Готовясь к переезду в новый офис, группа компаний Apply Logistic Group решила воплотить несколько интерьерных идей с помощью паллет. Такие рекомендации были получены от испанских дизайнеров, которые принимали участие в разработке интерьера нового офиса. Ведь Apply Logistic Group – что ни на есть занимается логистикой! Однако, немного подумав, сотрудники Apply Logistic Group приняли решение отказаться от данной затеи. Дело в том, что паллеты – это очень опасная вещь для здоровья человека. Мы знаем, что идея паллет в интерьере – это актуальный дизайнерский тренд последних нескольких лет, но он неизбежно привел бы к тому, что многие люди находились бы в постоянном контакте с активными канцерогенами, токсичными пестицидами и вредоносными бактериями.

Unit 2. Logistics Management and Organization

Text 1. Logistics Organizational Structures

Ex.1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Cross-functional, integral, interrelationships, overall, vital, derive, requirement, alternative, essential, procurement, sufficient, treat, short-term, distinguish, imperative, failure, recognize, adapt, arrangement effectively, emphasize, liason.

Ex. 2. *Read the text and do the tasks that follow.*

The importance of the corporate relationships (production, marketing and finance) has been emphasized, not least because of the move to a cross-functional, process-oriented view of the supply chain. This importance is particularly valid where the planning of corporate strategy is concerned.

There are two key points that bear re-emphasis at this stage. First is the fact that logistics is, for many companies, such an integral part of the corporate being. Because of this, the second major point becomes apparent - the need for logistics planning and strategy to be recognized and used as a vital ingredient in the corporate plan.

The first point – that logistics is such an important element within a company's total business structure – can be illustrated using the interrelationships of logistics with other functions:

– With production: Production scheduling, Production control, Plant warehouse design, Raw material stocks, etc;

– With marketing: Customer service, Packaging, Distribution centre location, Inventory levels, Order processing, etc;

– With finance: Stock-holding, Stock control, Equipment financing, Distribution cost control, etc.

The need to include the planning of logistics and distribution into the overall corporate plan is thus self-evident. Even within this strategic framework it can be seen that distribution and logistics factors should provide a vital input. Within the strategic planning process, such elements as market analysis and policy determination cannot be derived without an understanding of customer service requirements and channel choice alternatives. With any policy assessment exercise and in any subsequent determination of competitive strategy, knowledge of key logistics elements is essential. Any factors related to the procurement, storage and movement of goods must be relevant to the determination of a company's business plan.

The reason that companies fail to take sufficient account of the logistics input to corporate planning is probably due to the dynamic nature of the logistics environment and operation. Logistics is seen to be very much about doing and providing. As such, it can be viewed and treated as a short-term factor, with little direct relevance to long-term planning.

Logistics is a function with both long- and short-term horizons. Its very dynamism tends to mould the one into the other, making it difficult at the operational level to distinguish between the two. In addition, the consequence of inappropriate planning is often seen as a short-term operational problem. In effect, the size and extent of financial and physical investment makes it imperative that the differentiation between the long and the short term is made and that, where necessary, the relevant elements of distribution and logistics are included in the overall business plan.

Associated with the failure to include relevant logistics factors within the corporate business plan is the need to recognize that the logistics function may also require a specific organizational structure. For many years, logistics was barely recognized as a discrete function within the organizational structure of many companies. Although recently the importance of distribution and logistics has become much more apparent to a broad range of companies, a number have failed to adapt their basic organizational structures to reflect this changing view. Such companies have traditionally allocated the various physical distribution functions amongst several associated company functions. This failure to represent distribution and logistics positively within the organizational structure is thus often a result of historical arrangement rather than a specific desire to ignore the requirement for a positive logistics management structure. Clearly, some positive organizational structure is essential if the logistics function is to be planned and operated effectively. The problem with this type of organizational structure is that lines of communication are unclear. Thus, it is often impossible to optimize the efficiency of the different logistics sub-functions, let alone create an overall logistics system that is both effective and efficient. Several of the more forward-looking logistics-oriented companies have seen the need for some formal organizational change to represent the recognition now being given to the distribution and logistics activity. This new functional approach emphasizes the need for logistics to be planned, operated and controlled as one overall activity. The precise structure will obviously differ from one company. This type of structure allows logistics to be managed as a function in its own right, although the need for close liaison with other company functions remains vital.

Understanding the main points.

Ex. 3. Answer the questions.

1. What determines the importance of corporate relationships? 2. What are the two key points? 3. How can these two issues be illustrated? 4. Why does the knowledge of key logistics elements acquire such importance? 5. What explains the failure of some companies to take sufficient account of the logistics input to corporate planning? 6. In what way does logistics show its dynamism? 7. Why were distribution and logistics not included into the organizational structure? 8. Is logistics organizational structure the same for every company? 9. How does the organizational structure contribute to a company's overall performance?

Ex. 4. Expand on the following statements.

1. Corporate relationships acquire special importance at this stage of development. 2. The importance of logistics and distribution planning s becoming self-evident. 3. Logistics has both long- and short-term horizons. 4. Logistics acquires a more specific organizational structure.

Ex. 5. Work in pairs. Discuss logistics organizational structures.

Text 2. The Role of the Logistics or Distribution Manager

Ex.1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Vary, affect, internal, profile, extent, theme, contribution, input, interface, familiarity, insight, responsiveness, sensitivity, identify, rapport, facility, exist, range, performance, routeing, procurement, marshal, expand, remit, determine, target.

Ex. 2. Read the text and do the tasks that follow.

The role of the logistics or distribution manager can vary considerably from one company to another, dependent on the internal organizational structure, the channel type (own account, third party, etc), the industry or product, and the customer profile. Factors such as these will certainly affect the extent of the operational role and to a lesser extent the nature of the planning role. It is useful here to consider the part that the logistics or distribution manager can play in the planning process. M.A. McGinnis and B.J. LaLonde who discussed this question, take three main themes: the contribution that the logistics/distribution manager can make to corporate strategic planning; the advantages of this contribution; and the preparation that the manager can make to increase the effectiveness of his or her input.

The main points are as follows:

1. Contribution to corporate strategic planning: an understanding of the functional interfaces; an understanding of distribution's activities; familiarity with the external environment as it relates to distribution; insights regarding competitor distribution strategies; - familiarity with customer distribution needs; - familiarity with channels of distribution; - distribution data.

2. Advantages of contributing to corporate plan: understanding of impact of corporate strategy on distribution activities; - increased physical distribution responsiveness; - increased sensitivity to the distribution environment; identifying distribution opportunities; improving communications.

3. Preparation for strategic planning: - know the company; - develop a broader perspective of distribution; - know the distribution environment; - develop rapport/liaison with others;
- know customer needs; improve communication skills.

Logistics-related planning activities are thus a vital input in the overall business strategy. They involve a medium- to long-term planning horizon and will include aspects such as the number of facilities, their size and location, transport networks, fleet size and mix of vehicles, stock levels, information systems, etc. As already indicated, the operational role for managers can vary significantly according to the size and nature of the business, the product, the channel type and the customer profile, amongst other factors. Also, there are a number of different job titles and job functions that exist. These range from the distribution or logistics manager, who might have overall responsibility for an entire distribution network including central distribution centres, regional distribution centres, primary transport (line-haul) and delivery vehicles, stock location and control, computer systems, etc, to a shift manager or supervisor who might, for example, be concerned with the detailed performance and control of an order picking operation on a night shift.

Traditionally, the three main operational areas of responsibility are related to:

1. *transport* - primary transport (line-haul), delivery operations, vehicle routeing and scheduling, vehicle procurement, etc;

2. *warehousing* - goods inward, bulk storage, order picking, marshalling, materials handling equipment, etc; and

3. *information* - stock location, stock control, order processing, budgeting, monitoring and control, etc.

For many logistics managers, these areas may be expanded to cover other aspects such as procurement, inbound logistics, inventory levels, forecasting, telesales, production planning, reverse logistics, packaging, etc. In addition to these broad functional areas, there is a staff role concerning the management of human resources, union negotiation, health and safety, and the linkage to other corporate interfaces such as production, supply, marketing, sales and finance.

Over and above all of these aspects of the operational role, and probably common to all types of distribution organizations, is the responsibility for, and the need to control, the balance between the service to the customer and the cost of providing this service. From the point of view of supply chain planning, the key roles for a logistics manager with a broad remit might be summarized as:
• to lead the design, creation, configuration and parameter setting of the entire supply chain; • to create the framework and the dialogue that determine the performance targets along the whole chain; • to drive the systems and monitor and report the entire logistics operational performance against agreed targets; • to review how problems can be solved and performance improved.

Understanding the main points.

Ex. 3. Answer the questions.

1. What does the role of the logistics and distribution manager depend on? 2. What do the manager's responsibilities include? 3. In what way can a manager contribute to corporate strategic planning? 4. What are the advantages of his contribution to corporate plan? 5. What does preparation for a strategic planning mean? 6. What does a medium- or long-term planning suggest? 7. What influences the specificity of a manager's job? 8. What can a logistics manager's responsibilities be? 9. What are traditional operational areas that constitute a logistics manager's responsibilities? 10. How have these responsibilities expanded recently?

Ex. 4. Expand on the following statements.

1. Logistics or distribution manager's role varies from one company to another. 2. A manager plays a significant part in the planning process. 3. Activities that relate to planning are a vital input to overall organizational strategy. 4. There are traditional operational areas of a manager's responsibility. 5. Areas of a manager's responsibility have expanded recently.

Ex. 5. Work in pairs. Discuss the role of a logistics or distribution manager.

Text 3. Manufacturing and Materials Management

Ex.1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Technique, manufacturing, requirement, flexible, postponement, push, pull, expectation, carry out, lead time, estimate, arise, obsolescence, constituent, trigger, take place, scheduler, ensure, available, imbalance, lean, bring together, cell, speed up.

Ex. 2. Read the text and do the tasks that follow.

Materials management is an important and integral part of logistics management. Its most common forms of manufacturing planning and control techniques are: • just-in-time; • manufacturing resource planning (MRPII), incorporating material requirements planning (MRP); • flexible fulfillment or, as it has come to be known, postponement. But it is worth explaining a few terms that are often used when production scheduling and control systems are discussed.

Push and pull systems.

A 'push' system of manufacturing is one where goods are produced against the expectation of demand. In other words, goods are not produced specifically to order but are produced against a forecast demand. Demand forecasting has to be carried out where raw material suppliers' lead times for delivery have to be considered. If there is a one-month lead time for a given raw material then it will be necessary to estimate what the level of production will be in one month's time to satisfy forecast demand for the product. These forecasts are usually based on historical sales information. The difficulty arises when either there is a higher level of demand than expected and sales are lost, or there is a lower level of demand and finished product stocks grow too

large. Lost revenue from missed sales opportunities is the result on the one hand, and higher inventory carrying costs or product obsolescence costs are the result on the other. MRPII (incorporating MRP) is a 'push' system.

A 'pull' system of manufacturing is one where goods are only produced against known customer orders. This is because only actual orders from customers are being produced on the production line. None of the goods are being made to keep as finished product stocks that may be sold at a later date. Therefore firm customer orders are 'pulling' all the materials through the process from the material suppliers and culminating in the delivery to the final customer. Just-in-time is a 'pull' system.

Dependent and independent demand.

Dependent demand is created by the demand for the constituent parts of the finished product. In other words, because it is planned to make a given finished product, this decision triggers the demand for all the constituent parts of that product. In this situation there is no uncertainty and activities may be planned accordingly. Therefore, when the production scheduling activity is taking place, the quantity and required delivery dates of the constituent parts are known to the schedulers. Independent demand is quite the opposite. In this situation the schedulers do not have a clear view of customer demand and are therefore forced to forecast demand in the best way they can. The demand for spare parts for products sold in the past is a good example of this type of demand. This is a very difficult situation, which is full of uncertainty. The schedulers must try to ensure goods and services are available when the customers require them. Almost by definition in this situation there will always be a state of imbalance between supplies of the goods and services and the demand for those same goods and services.

Cellular manufacturing.

The use of work cells is frequently used in lean manufacturing environments. A work cell is more than a single machine location but smaller than a manufacturing department. A small group of workers are brought together in one part of the factory to produce a certain product or range of products. In their cell they will have all the machines, resources and materials available to produce these products. Production workers in the cell produce the product in a mini production line ideally passing the product progressively from one worker to the next. This system speeds up processing time, while quality, co-ordination, communication and teamwork between workers are all improved by this technique. The travel distance and travel time in the factory are also reduced by this system of cellular working.

Understanding the main points.

Ex. 3. Answer the questions.

1. What are the most common forms of manufacturing planning and control techniques? 2. What is the essence of manufacturing 'push' system? 3. How important is demand forecasting? 4. What is a 'pull' system? 5. How does it work? 6. How is dependent demand created? 7. In what way is independent demand different from dependent one? 8. How is cellular manufacturing viewed? 9. How does cellular manufacturing facilitate production process?

Ex. 4. Expand on the following statements.

1. Materials management is an important and integral part of logistics management. 2. In a 'push' system of manufacturing goods are not produced to order. 3. In a 'pull' system of manufacturing goods are produced according to customer orders. 4. The decision to make a finished product triggers dependent and independent demand. 5. Cellular manufacturing is mostly used in lean manufacturing environments.

Ex. 5. Work in pairs. Discuss manufacturing and materials management.

Text 4. 'Just-in-Time' Management Philosophy

Ex.1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Aim, set, automobile, elimination, seek, manage, reasonable, cover, erratic, imagine, batch, build-up, waste, counter, encourage, engender, scrap, reworked, appraise, defective, brevity, skim, empowerment, changeover, arguably.

Ex. 2. Read the text and do the tasks that follow.

'JIT aims to meet demand instantaneously, with perfect quality and no waste' (Bicheno, 1991). Strictly speaking, this is not so much a clearly defined system of materials management but more a set of management philosophies that work together to create the desired effect. This approach was first developed in Japan by Toyota, the automobile manufacturer, in the 1970s. In its early days it was known as the 'Toyota manufacturing system' or 'Toyoterism'. The label 'just-in-time' was applied later.

One of the central ideas of this system is the elimination of waste ('muda' in Japanese) from the manufacturing process. In this context, 'waste' does not refer simply to reworking or scrapping sub-standard products. Waste within the just-in-time environment means waste in all its manifestations. It seeks to reduce what is known as 'the seven wastes': 1. overproduction; 2. waiting; 3. transporting; 4. inappropriate processing; 5. unnecessary inventory; 6. unnecessary motions; 7. defects.

Elimination of wasted time.

Because only customers' orders are being produced and the speed of the production process is known, it is possible to synchronize deliveries of raw materials to the end of the production line (or to the precise point on the production line in some cases) with little time to spare before use. The whole purpose of this exercise is to reduce the working capital used in the overall manufacturing system. In turn this produces a better return on capital employed. The other benefits are that there is little or no requirement for factory space to be used for storage and a reduced requirement for labour to manage the stock. This is the origin of the name 'just-in-time'.

Movement through the manufacturing process.

If materials move through the system in a straight line it is reasonable to suppose that the minimum distance has been covered. In many manufacturing

systems this is not always possible. In fact it has been identified in some manufacturing processes that components and sub-assemblies are moved around the factory in a very erratic pattern before they all come together in the finished product. Attempting to minimize the overall distance that materials have to travel through the system helps avoid wasted travelling time and effort.

Kanban.

The word 'Kanban' (the signal) refers to a system of cards (other methods such as marked squares on the floor or balls are used in some cases), which is used to organize the progress of materials through the manufacturing process. It may be easier to understand the system if squares marked on the floor of the factory are imagined. The squares contain work-in-progress required by the next step in the manufacturing process. The squares become empty as the materials are used. The next batch of materials may only move into a square when the square is empty. This approach is replicated as materials move progressively from one step to the next. Thus no build-up of goods occurs, and materials move through the system in an orderly fashion. The problem is that goods will have to move through the system at the speed of the slowest element in the chain. However, large online work-in-progress stocks will be eliminated. This too contributes to the reduction of working capital being used by the system.

Right first time.

Quality problems in the form of scrapped or reworked products are waste of the first order. The Japanese developed several strategies to counter this problem. In one case they built their factory with no area to store scrap on the principle that having an area for scrap encouraged its production. Quality circles were created, where workers were allocated time specifically given over to discussing quality issues and their elimination, the target being zero defects. The philosophy of Kaizen, or continuous improvement, was engendered as a working culture in these organizations with support at the very top. Systems of quality management such as total quality management (TQM) and ISO 9000 seek to achieve the same ends. The causes of scrapped or reworked production may not originate in the factory itself and may be caused by sub-standard raw materials being supplied to the process. Increasingly, suppliers' performance is critically appraised and measured in defective parts per million or in some other way. Working in a positive environment with suppliers to eliminate problems quickly is the preferred approach. Involving suppliers in new product development helps eliminate potential problems before they are translated into the production process. Many companies have now adopted Six Sigma as a formal process improvement technique. Literally, this aims to control a process to the point of six sigma (ie standard deviations), which equates to 3.4 defects per million. The processes in this technique normally consist of DMAIC (define, measure, analyse, improve and control).

Finished product stocks.

These stocks only contain goods produced to a specific customer order. This too contributes to a reduction in working capital. Because of the needs of brevity it has only been possible to skim the surface of the JIT philosophy. Subjects such as the reduction of set-up and changeover times, team working and empowerment, total

productive maintenance, leveled production schedules and many more are arguably no less important.

Understanding the main points.

Ex. 3. Answer the questions.

1. What is the 'just-in-time' objective? 2. When and where was this approach first developed? 3. What is the core idea of this concept? 4. What does the term 'waste' relate to? 5. How can wasted time be eliminated? 6. Optimization of materials movement through the manufacturing process helps to avoid travelling time and effort, doesn't it? 7. How can kanban help to organize the materials movement through the manufacturing process? 8. How did the Japanese try to counter quality problems? 9. How can finished product stocks contribute to reduction in working capital?

Ex. 4. Expand on the following statements.

1. 'Just-in-time' approach was first developed in Japan. 2. Elimination of wasted time may reduce the working capital. 3. Materials movement through the manufacturing process helps to minimize wasted travelling time and effort. 4. Kanban system is used to organize the progress of materials through manufacturing process. 5. The Japanese developed several strategies to fight quality problems. 6. Finished product stocks may contribute to a reduction in working capital.

Ex. 5. Work in pairs. Discuss the 'just-in-time' management strategy.

Text 5. Manufacturing Resource Planning (MRP II) and Material Requirements Planning (MRP)

Ex.1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Pre-date, he other way round, imply, harmonize, enormous, premise, master schedule, owe, timing, bill of requirements, customize, on hand, current, immediate, feed into, anticipate, capacity, iterative, forecast, perpetuate, volatile, frequently.

Ex. 2. Read the text and do the tasks that follow.

Although MRP pre-dates MRP II, it is easier to see MRP in the context of MRP II rather than the other way round. As the name implies, manufacturing resource planning deals with more than simply production scheduling. Whilst the basic material requirements planning system is incorporated into MRPII, the wider system brings other activities into the picture. The objective is to harmonize and control more of the activities within the production plant. Areas outside an MRP system but included in an MRP II system usually are: • maintenance management; • cost accounting; • stock management; • sales orders; • procurement; • personnel levels.

MRP II requires considerable computing power to operate because of the inclusion of virtually all the activities within a production plant. Implementation of such a sophisticated computer-based system is an enormous task and should not be undertaken lightly.

This principle of production scheduling (material requirements planning) is based on the premise that if one knows what product needs to be produced then one should also know how many constituent parts are required in order to make the product.

The MPS is a list of all the products or services to be supplied within a specific period of time. This period of time must be sufficiently long to allow for the ordering and delivery of required sub-assemblies and parts, as well as allowing sufficient time for manufacturing the product in question. The schedule may be made up of forecast demand and actual known demand, i.e. customers' orders. It also lists all the required outputs from the system and when the goods and services are required through the use of a 'due date'. Therefore the contents of the schedule will dictate the contents of the bill of requirements.

The bill of requirements. This is also referred to as the bill of materials (BOM). This will list all the sub-assemblies, components and parts required in total to produce all the goods listed in the master schedule. It will also show the different levels at which these constituent parts are put together in order to produce the finished goods. For example, the finished product may contain two sub-assemblies that together complete the product. The finished product is said to be at level O. These assemblies will be numbered sub-assembly 1 and sub-assembly 2. Together these sub-assemblies are said to be at level 1. Both sub-assemblies are made up of one component and one further sub-assembly each. This level is described as level 2. Owing to the fact that the two major sub-assemblies at level 1 themselves contain one further sub-assembly each at level 2 then a further level is created at level 3. At level 3 it can be seen that one of the sub-assemblies at level 2 contains two components and the other contains four components. This process (sometimes referred to as netting) is continued until all the constituent parts are broken down and listed at different levels. It can be quickly seen that, if the bill of requirements for each product is viewed from the opposite direction to the finished product, ie the highest-level number first, then one is looking at a sequence for assembly. The components are put together to form sub-assemblies, which in turn are put together to form the finished product. This bill of requirements, having detailed all the required parts and subassemblies, will allow the MRP program to create the required orders to be placed with suppliers. One important thing to remember is that it also lists in detail the order and timing when these parts are required. Noting the level of detail in the bill of requirements for just one product, it may be easier to understand the level of complexity involved in scheduling many different products that may contain many more components. It will also underline the complexity involved in changing the master schedule due to cancellations or additional orders. For anything more than a very basic schedule, a customized computer program will be required to deal with the large number of transactions required to effect the most straightforward of changes to the schedule.

Opening stock. The master schedule and the bill of requirements together form the framework of what is required and when it is required, but two other factors must be fed into the computer program at the same time. The first of these will be the current level of unallocated stocks of parts, components and sub-assemblies available for immediate use. There will be in total larger stocks on hand but these will already have been allocated to production via the system and are therefore unavailable. This information will, of course, modify any orders for raw materials placed on suppliers.

Opening capacity. The final fundamental factor required by the MRP program is the current level of available unallocated production capacity for not only the finished product but any components or sub-assemblies that are manufactured in-house. All of the above information - the master schedule, the bill of requirements, the opening stock and the opening capacity - will be fed into the MRP computer programme. The program will then produce the following:

- a list of purchase requirements, which will list what needs to be purchased and when;
- a manufacturing schedule, which will list what will be made and when it will be made;
- the closing stock of parts, components and sub-assemblies after the master schedule has been completed;
- the closing capacity available after the master schedule has been completed;
- a list of anticipated shortfalls in production - these may be due to shortages of parts or capacity.

The whole MRP process is iterative and therefore must be repeated periodically. This may be done on what is known as a 'regenerative' basis or a 'net change' basis.

The 'regenerative' basis involves assuming that no previous MRP calculation has taken place. Therefore known or forecast demand is used to create a new bill of requirements, with available parts of stock and available production capacity being allocated disregarding any previous calculations. For the purposes of this approach, all parts and capacity are assumed to be unallocated, as existing orders and work-in-progress will be covered by the new master schedule. This approach tends to be used where demand and therefore output are fairly consistent. This method also has the advantage of not perpetuating any previous computation errors as each new calculation starts from fresh current data. The 'net change' approach concentrates on changing only those parts of the production plan that have changed rather than recalculating the whole plan. Thus, if changes are made to the master schedule then only those parts of the plan that are affected will be changed. This method tends to be used more in situations where demand is more volatile and so changes are more frequently needed.

Understanding the main points.

Ex. 3. Answer the questions.

1. What is the essence of manufacturing planning? 2. What is its objective? 3. What does MRP II need to be able to operate successfully? 4. What makes the basis of material requirements planning? 5. What does basic material requirements

planning include? 6. What is included into the bill of requirements? 7. How are different levels necessary to produce goods grouped together? 8. What factor should be taken into account before feeding them into a computer programme? 9. What will the programme then produce after all the necessary factors are fed into the MRP computer programme? 10. Why must MRP process be periodically repeated? 11. What does the 'regenerative' MRP basis presuppose?

Ex. 4. Expand on the following statements.

1. MRP pre-dates MRP II. 2. Basic MRP system structure is rather complicated. 3. The bill of requirements lists all sub-assemblies, components and parts necessary to produce goods envisaged by the master plan. 4. The master schedule, the bill of requirements, the opening stock and the opening capacity will embrace the whole MRP process. 5. The MRP approach is built on 'regenerative' basis.

Ex. 5. Work in pairs. Discuss the issues relating to manufacturing resource planning and material requirements planning.

Text 6. Types of Stock-holding and Inventory Costs

Ex.1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Crucial, vital, throughout, build up, warehouse, eventual, mixture, breakdown, utility, maintenance, repair, overhaul, consumables, rotables, repairables, batch, inward, depict, fluctuation, depict, buffer, speculative, bring forward, stockpile, significant, trade-off, awareness, charge, tie up, insurance, consequence, deterioration, underestimate, relevant, set up, apply, delivery, incur, shortage, notoriously, penalty.

Ex. 2. Read the text and do the tasks that follow.

Decisions regarding the amount of inventory that a company should hold and its location within a company's logistics network are crucial in order to meet customer service requirements and expectations. But there is, potentially, a large cost associated with holding inventory. It is vital to get the balance of cost and service right.

There are a number of different stock types that can be found in company supply chains. These are generally held at strategic positions throughout the company logistics network and in particular at the interfaces with suppliers or customers.
The main categories are:

- raw material, component and packaging stocks – generally used to feed into a production or manufacturing process;
- in-process stocks – sometimes known as work-in-progress (WIP), these consist of part-finished stock that is built up between different manufacturing processes;

• finished products – stocks that are held at the end of the production line normally in a finished goods warehouse and sometimes known as finished goods inventory (FGI);

• pipeline stocks – probably the most common type of stock-holding, these are held in the distribution chain for eventual transfer to the final customer;

• general stores – containing a mixture of products used to support a given operation, for example a large manufacturing plant;

• spare parts – a special category because of the nature of the stock, which provides a crucial back-up to a manufacturer's machinery or plant where any breakdown might be critical, and also held by service and maintenance companies for supply to their customers to support service contracts. Service industries, such as utilities, hospitals and maintenance, repair and overhaul (MRO) providers, invest in spare parts inventory to support their service offer. They have two main stock categories:

– consumables (nuts, bolts, etc);

– rotables and repairables (parts that require periodic maintenance or are repairable).

Within the above categories, stock can again be broken down into other major classifications:

• Working stock. This is likely to be the major element of stock within a distribution depot's stock-holding, and it should reflect the actual demand for the product.

• Cycle stock. This refers to the major production stock within a production warehouse, and it reflects the batch sizes or production run lengths of the manufacturing process. This flow of inward supply and outward demand for a product in a warehouse is often depicted as a classic 'saw-tooth'.

• Safety stock. This is the stock that is used to cover the unpredictable daily or weekly fluctuations in demand. It is sometimes known as 'buffer' stock, as it creates a buffer to take account of this unpredictability.

• Speculative stock. This can be raw materials that are 'bought forward' for financial or supply reasons, or finished stock that is pre-planned to prepare for expected future increases in demand.

• Seasonal stock. This is product that is stockpiled to allow for expected large increases in demand. Typically, this would include inventory built up prior to the Christmas demand peak.

Inventory costs are one of the major logistics costs for a large number of manufacturing and retail companies, and they can represent a significant element of the total cost of logistics. There are many major cost trade-offs that can be made with all the other key logistics components. It is important to be able to understand what the key cost relationships are within a company. To do this, an awareness of the major elements of inventory cost is essential. There are four principal elements of inventory holding cost. They are:

1. Capital cost: the cost of the physical stock. This is the financing charge that is the current cost of capital to a company or the opportunity cost of tying up capital

that might otherwise be producing a better return if invested elsewhere. This is almost always the largest of the different elements of inventory cost.

2. Service cost: the cost of stock management and insurance.

3. Storage cost: the cost of space, handling and associated warehousing costs involved with the actual storage of the product.

4. Risk cost: this occurs as a consequence of pilferage, deterioration of stock, damage and stock obsolescence. With the reduction in product life cycles and the fast rate of development and introduction of new products, this has become a very important aspect of inventory cost. It is one that is frequently underestimated by companies. It is particularly relevant to high-tech industries, the fashion industry, and fresh food and drink.

Another important cost that needs to be understood is the reorder or the set-up cost for an individual product. The reorder cost refers to the cost of actually placing an order with a company for the product in question. This cost applies regardless of the size of the order. It includes the cost of raising and communicating an order, as well as the costs of delivery and order receipt. The set-up cost refers to the additional cost that may be incurred if the goods are produced specifically for the company. Here, the larger the order, the longer the production run and the lower the production unit cost of the items in question. Of course, orders for large amounts of a product will result in the need for it to be stored somewhere – at a cost! This is yet another classic logistics trade-off decision that needs to be made.

The final inventory-related cost is the shortage cost - the cost of not satisfying a customer's order. This cost is notoriously difficult to measure. It is used to try to reflect the penalty of not holding sufficient stock of a product, which may lead to lost profit due to lost sales, loss of future sales, loss of reputation and the cost of the urgent delivery of unsatisfied orders.

Understanding the main points.

Ex. 3. Answer the questions.

1. Why are the issues of inventory amount very crucial for any company's logistics? 2. Holding inventory involves a large cost, doesn't it? 3. What categories of stock types can be found in company supply chains? 4. Inventory costs constitute major logistics costs, don't they? 5. What is the best way to understand cost relationships within a company? 6. What are the four principal elements of inventory holding cost? 7. What does re-order cost include?

Ex. 4. Expand on the following statements.

1. Inventory amount is crucial in meeting customer service requirements and constitutes a large cost. 2. There are several main categories of stock types. 3. There are four principal elements of inventory holding cost. 4. The set-up cost for a product is another very important cost. 5. The shortage cost is difficult to measure.

Ex. 5. Work in pairs. Discuss the types of stock-holding and inventory costs.

Text 7. Inventory Planning for Manufacturing

Ex.1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Excess, retailer, applicable, circumstance, streamlined, predictable, variable, feasible, assumptions, replenishment, undergo, encounter, schedule, calculate, obvious, counter, chunk, enable, concept, illustrate, compression, compatible, take care, virtuous.

Ex. 2. *Read the text and do the tasks that follow.*

Inventory planning has traditionally been applied in particular at the finished goods end of the supply chain. It is now an activity that is seen to have relevance for stock held at all stages within the supply chain. Companies are beginning to understand that the cost of excess or unnecessary stock held anywhere in their supply chain, whether they have direct responsibility for it or not, is still going to have an impact on their bottom-line costs. Thus, raw material and component stock-holding levels are seen to be relevant and to provide an opportunity for cost improvement. Some retailers have begun to ask their suppliers to take responsibility for the planning and management of the stock of products they supply. Because of this changing approach to inventory responsibility, the traditional methods of inventory planning are now becoming less applicable for many companies. This applies to the economic order quantity (EOQ) concept. Although still a useful and valid tool in many circumstances, some of the main assumptions on which it is based are less realistic for companies that have adopted a more streamlined approach to their logistics and supply chain activities. For example:

• Demand is not as predictable as it may once have been. • Lead times are not constant – they can vary for the same product at different order times.

• Costs can be variable. Order cost relationships have changed with the introduction of automatic and electronic data interchange (EDI) related ordering procedures.

• Production capacity can be at a premium; it may not always be feasible to supply a given product as and when required.

• Individual products are closely linked to others and need to be supplied with them, so that 'complete order fulfilment' is achieved.

Thus, the main assumptions that are the basis for the EOQ may not now hold true for a number of companies and their products. This can be linked to the introduction of continuous replenishment, which is now at the heart of many companies' supply policies. This means that orders are for much smaller quantities and are required much more frequently. The rules that once applied to inventory planning are undergoing a change. This is certainly true for many large companies, although the application of EOQ is still very relevant to many small and medium-sized enterprises.

Recent developments in inventory planning are aimed at solving some of the problems encountered by the use of the more traditional approaches to stock replenishment. They are based on the concept of *materials requirements planning*

(MRP), which is a computerized system for forecasting materials requirements based on a company's master production schedule and bill of material for each product. This has subsequently been developed into *manufacturing resource planning* (MRPII), which is a broader-based system, used to calculate the time-phased requirements for components and materials with respect to production schedules, taking into account replenishment lead times, etc. This approach enables inventory levels to be significantly reduced, and service levels, in terms of shorter production lead times, to be improved. MRP systems are now quite well established, as are other related techniques such as 'just-in-time' (JIT) or Kanban systems. The obvious advantages of these systems to manufacturing have led to the further development of associated techniques for distribution - distribution requirements planning (DRP). DRP systems are designed to take forecast demand and reflect this through the distribution system on a time-phased requirements basis. DRP thus acts by pulling the product through the distribution system once demand has been identified. It is particularly useful for multi-echelon distribution structures to counter the problems of requirements occurring as large chunks of demand.

The most recent systems adopt an even broader planning approach. These are time-phased and enable planning across a whole business and even across complete supply chains. They are known, respectively, as *enterprise resource planning* (ERP) and *supply chain planning* (SCP).

The concept of *time compression is* an important approach in the planning of manufacturing inventory requirements, or perhaps it should be termed as the planned reduction in manufacturing and WIP inventory. The opportunities for such reductions have been illustrated in the above discussion on analysing time and inventory, where the use of supply chain mapping enables the identification of feasible time and inventory savings. Time compression techniques provide the means for achieving these improvements.

A typical approach includes:

- the need to take a complete supply chain perspective when planning;
- the need to undertake appropriate analysis;
- the identification of unnecessary inventory and unnecessary steps in key processes;
- working towards customer service requirements as well as cost minimization when planning for production;
- designing products to be compatible with supply chain requirements;
- designing production processes to be compatible with supply chain requirements.

Time compression is a relatively simple exercise to undertake. Supply chain mapping can be used as the starting point to help identify the major opportunities for time and inventory saving. The next stage is then to 'walk the process', taking care to follow and record every detailed step in the process. Each activity is then measured according to the total time, including both 'value added' time and 'wasted time'. The process is then reassessed or re-engineered to eliminate as much wasted time as is possible. Time, and thus inventory, is taken out of the system and in this way overall cost is reduced. Time compression is a technique that provides a means to identifying and improving processes that can lead to a number of potential benefits. It is a way of creating a 'virtuous circle' of improvement.

Understanding the main points.

Ex. 3. *Answer the questions.*

1. How did the view on inventory planning change throughout years? 2. Why is it now understood as having relevance for stock held at all stages of supply chain? 3. Is 'economic order quantity' concept widely used now? 4. How did this approach transform and is perceived now? 5. What does the concept of 'continuous replenishment' imply? 6. What is the aim recent developments in inventory planning? 7. What is material requirements planning? 8. What is manufacturing resource planning? 9. What is the outcome of employing this approach? 10. Why are distribution requirements planning systems designed? 11. How do these systems work and in what spheres are they applicable? 12. What do time-based systems embrace? 13. What effects does time-compression allow to achieve? 14. What are the elements of 'time-compression' concept?

Ex. 4. *Expand on the following statements.*

1. Inventory planning is now applied to stock held at all stages within a supply chain. 2. Economic order quantity concept changed its essence in the last years. 3. Recent developments in inventory planning aim at solving problems of stock replenishment. 4. Most recent systems adopt even broader planning approach. 5. Time-compression is a relatively simple exercise.

Ex. 5. *Work in pairs. Discuss the issues of inventory planning for manufacturing.*

Unit 3. THE SUPPLY CHAIN

Text 1. Notion of Supply Chain

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Focus, work in isolation, act as sb/sth, deliver, deliver, manufacturer, sell, a series of organizations, dairy, distributor, journey, extract crude oil, refinery, emphasize, refer (to), satisfy, unique supply chain, chocolate, move 'from dirt to dirt', go beyond sth.

Ex. 2. *Read the text and do the tasks that follow.*

So far, we have focused on the movement of materials through a single organization. In reality, organizations 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, delivers these into components, and passes the results to other manufacturers. Most

products move through a series of organizations 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 organizations before it reaches our desk.

People use different names for these chains of activities and organizations. When they emphasize the operations, they refer to the process; when they emphasize 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 emphasizing the movement of materials and will use the most general term of supply chain.

> *A supply chain consists of the series of activities and organizations that materials move through on their journey from initial suppliers to final customers.*

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.

Ex. 3. *Answer the questions.*

1. Do organizations work as customers as well as suppliers simultaneously? 2. What way do products have to travel from suppliers to customers? 3. What way does milk travel before we buy it? A toothbrush? 4. What names are used to describe these activities when we emphasize different aspects of organizations' activities? 5. What term is used in relation to the movement of materials? 6. Do products have similar supply chains? Give examples. 7. What stages do materials pass as they move 'from dirt to dirt'? 8. Does the supply chain always finish with the final customer? 9. Supply chains can be both long and complicated, can't they?

Ex. 4. *Expand on the following statements from the text.*

1. Organizations do not work in isolation. 2. Most products move through a number of organizations on their way to final consumers. 3. Different names are used to describe this movement of materials and an organization's activities. 4. The supply chain may go beyond the final customer.

Ex. 5. *Work in pairs. Describe the notion of a supply chain.*

Text 2. Structure of Supply Chain

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Single, inwards, upstream, downstream, tiers of suppliers, original source, fairly easy, general approach, hub, local feeder services, cheque, blood transfusion, wholesaler, complicated, grow cotton, provide, garage, individual customers, separate strand, alternative route, mergers and divisions, countless, information transfer, complex pattern.

Ex. 2. Read the text and do the tasks that follow.

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

In practice, most organizations 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 customer.

It is fairly easy to imagine the shape of a manufacturer's supply chain, but most other organizations 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 recognize 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' section on the example of Wal-Mart.

Ex. 3. *Answer the questions.*

1. What is the simplest way to imagine a supply chain? 2. What is added to a product as it moves from organization to organization? 3. What terns are used to describe the movement of materials with reference to an organization's positioning? 4. Into what are the upstream activities divided? What about the downstream activities? 5. How does the supply chain behave when we talk of many different suppliers and customers? 6. There is a great number of different supply chain configurations, isn't there? 7. What is the reason for dividing supply chains? 8. What makes the real picture of supply chain so complex?

Ex. 4. *Expand on the following statements from the text.*

1. A single product movement through a series of organizations can give the simplest idea of a supply chain? 2. The upstream activities are divided into tiers of suppliers. 3. Customers are also divided into tiers. 4. Most organizations cooperate with many suppliers, and sell to many customers. 5. It's fairly easy to imagine the shape of a manufacturer's supply chain. 6. Each product has its own supply chain. 7. Supply chains diverge to meet customers' demands. 8. Supply chains is quite a complicated phenomenon.

Ex. 5. *Work in pairs. Describe the structure of a supply chain.*

Logistics in practice

Wal-Mart

In 1962 Sam Walton opened a discount store in Rogers, Arizona. He attracted customers with a combination of low prices, a wide range of goods and friendly service. Sam called his store Wal-Mart, and was so successful that he quickly opened more branches. In 1983 he opened a SAM'S Club warehouse for members, and in 1988 the first 'Supercenter' selling groceries. By 1991 Wal-Mart had become the leading retailer in the USA, and started its international expansion. It moved into Mexico, Puerto Rico and Canada, and then into South America, Asia and Europe. Most of its later expansion came through buying local companies, such as ASDA in the UK.

Wal-Mart always kept the same emphasis on low prices, a wide range of products and friendly service. The scene is set at the front door of each store, where a staff member greets customers and tells them about special offers and promotions. By 2000 Wal-Mart was the world's largest retailer with 4000 stores, serving 100 million customers a week, employing 1.2 million staff – or 'associates' – an annual turnover of US$175 billion and profit of US$6 billion a year.

You can imagine the size of the logistics in Wal-Mart. On mainland USA they have 85,000 suppliers sending $1.5 billion dollars' worth of materials a week to 62 main distribution centres, and on to 1800 Wal-mart stores, 800 Supercenters, 460 SAM's clubs and 13 Neighbourhood Markets. A large part of Wal-Mart's operating expenses depend on the efficiency of their logistics. When margins are tight, a small change in logistics performance and costs has a considerable effect on profit. This is why Wal-Mart use the 'industry's most efficient and sophisticated distribution system'. Their success can be judged by continuing expansion, with annual sales up 20 per cent in the first quarter of 2000, and like-for-like sales up 5 per cent.

Text 3. Benefits of Supply Chains

Ex. 1. *Make sure you know the following words and word combinations.*

Wonder, avoid, though, author, suppose, deliver, be plentiful, divert, processing plant, coffee beans, fuel supplies, allow for mismatches, throughout, sugar cane, beet, harvest, delivery routes, wholesaler, intermediary, regardless (of), facilities, get economies of scale, stocks of finished goods, place an order, have short lead times, develop expertise.

Ex. 2. *Read the text and do the tasks that follow.*

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 organize 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. Logistics has to organize 32 different delivery routes but, if the factories use a central wholesaler, the number of routes is cut to 12.

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 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.
- ▶ Organizations can develop expertise in specific types of operation.

Ex.3. *Answer the questions.*

1. Is it possible to refuse supply chains? 2. Can you give reasons in favour of having a supply chain? Supply examples. 3. Why supply chains exist? 4. Do supply chains allow for mismatches between supply and demand? 5. What are the benefits of well-designed supply chains?

Ex. 4. *Expand on the following statements from the text.*

1. Sometimes it is possible o avoid supply chains. 2. There are good reasons for having supply chains. 3. Supply chains help to overcome the distance between suppliers and customers. 4. Supply chains allow for mismatches between supply and demand. 5. A well-designed supply chain brings more benefits to an organization.

Ex. 5. *Work in pairs. Describe the benefits of supply chains.*

Worked Example 1

J. Mitchell currently has sales of £10 million a year, with a stock level of 25% of sales. Annual holding cost for the stock is 20% of value. Operating costs (excluding the cost of stocks) are £7.5 million a year and other assets are valued at £20 million.

What is the current return on assets? How does this change if stock levels are reduced to 20% of sales?

Text 4. Logistics Separate Activities

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Include, initiate, procurement, find suitable suppliers, negotiate terms and conditions, insurance, process orders, clerical job, give attention, purchase, recognize, traffic, transport operator, meet requirements, reasonable, correspond, vehicle, damage, acknowledges receipt, unload, emit fumes, inventory, consolidate, departure, wrap, appropriate, align, significant role, exchange of information', sales forecasting, production scheduling, consider the problems.

Ex. 2. *Read the text and do the tasks that follow.*

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 organization, you can see that the following activities are normally included in logistics.

■ *Procurement or purchasing.* The flow of materials through an organization is usually initiated when procurement sends a purchase order to a supplier. This means that procurement finds suitable suppliers, negotiates terms and conditions, organizes delivery, arranges insurance and payment, and does everything needed to get materials into the organization. In the past, this has been seen as a largely clerical job

centered on order processing. Now it is recognized as an important link with upstream activities, and is being given more attention.

■ *Inward transport or traffic* actually moves materials from suppliers to the organization'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 organization. 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 organization 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 organizations, 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. Coordinating the flow of information can be very difficult, and logistics managers often describe themselves as processing information rather than moving goods. M. 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 organization 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 recognize that they must all work together to get an efficient flow of materials.

Ex. 3. *Match the words with their definitions.*

1) recycling	a) likely to injure or harm sb, or to damage or destroy sb
2) waste	b) a heavy wooden or metal base that can be used for moving or storing goods
3) pallet	c) a hard, usually transparent substance used for making windows or bottles
4) disposal	d) opposite to what has been mentioned
5) faulty	e) treating things that have already been used so that can be used again
6) reel	f) not perfect, not working or made correctly
7) container	g) the act of using smth in a careless or unnecessary way, causing it to be lost or destroyed
8) glass	h) a round object around which you can wind such things as the thread, wire or film
9) dangerous	i) the act of getting rid of smth
10) reverse	j) in which smth can be stored or transported

Ex. 3. *Answer the questions.*

1. What activities does logistics include as materials move through the supply chain? 2. Where does procurement start? 3. What is its essence? 4. What makes receiving an important aspect of logistics? 5. What stage do moving of materials and taking care of them mark? 6. What is the purpose of stock control?

Ex. 4. *Decide which of the following statements are either true or false.*

1. Order picking considers customer service, order sizes and stock levels. 2. Material handling moves materials from suppliers. 3. Outward transport moves

materials into storage. 4. The term 'physical distribution management' sets policies for finding suitable suppliers. 5. All organization's logistics activities must be done in one location.

Ex. 5. *Expand on the following statements from the text.*

1. Logistics normally include many different activities. 2. The work of logistics is not finished after products have been delivered to customers. 3. Some logistics activities may be carried out in different locations. 4. Logistics is associated with the flow of information between different parts of the supply chain. 5. Logistics may include many different activities.

Ex. 6. *Work in pairs. Describe different other activities that logistics normally include.*

Logistics in practice

Konigshaven Suppliers

Konigshaven Suppliers is a food wholesaler, delivering to supermarkets in southern Denmark. Its standard accounting systems do not identify separate logistics costs, and this makes it difficult to identify areas with particularly high costs, or those that need improving. To get a clearer picture, the company ran a survey in one main warehouse. It used some estimates and simplifications, but feels that the following figures give a reasonable view. These figures show the costs incurred for each €100,000 of net sales.

a. *Cost of sales: €58,000* (The cost of purchasing products sold on to customers, including administration of the purchasing office)

b. *Transport inwards: €3000* (Cost of bringing goods from suppliers and delivering to the warehouse)

c. *Other costs of delivery to warehouse: €4000* (A general category covering any other costs of relations with suppliers)

d. *Warehousing and handling: €7000* (Costs of receiving materials, checking, sorting, moving to the warehouse and storing)

e. *Stock financing: €1000* (The cost of financing stock, including debt charges)

f. *Sales force: €12,000* (Salaries and costs of the sales office)

g. *Special promotions: €3000* (Including presentations, visits and samples)

h. *Delivery to customers: €5000* (Costs of taking goods out of the warehouse and delivering to customers)

i. *Debt financing: €2500* (Costs of financing plant and equipment)

j. *Information processing: €2000* (Including all aspects of order processing)

k. *Returns and recycling: €500* (Cost of recovering pallets and any other materials returned to the warehouse)

These figures are open to some interpretation, but they show that transport accounts for 12 per cent of sales and warehousing for 8 per cent. Several other costs might be included in logistics, including some purchasing, sales, information processing and recycling.

Case Study

Ace Dairies

Ace Dairies gives a home delivery service for milk, dairy products and a range of related goods. Roger Smitheram has run the dairy for the past twelve years. His product is a combination of goods (the items he delivers) and services (the delivery and associated jobs he does for customers).

At the heart of operations is an information system which contains full details of all Roger's 500 customers, including their regular orders, special orders, where to deliver, how they pay, and so on. Every day the system calculates the likely sales of all products in two days time. Roger adds some margin of safety, allows for likely variations and passes his order to Unigate Dairy in Totnes in Devon (about 150 km away). This Unigate depot acts as a wholesaler for milkmen in Wales and the southwest of England. The following evening it delivers to a holding depot in Camborne, and then takes Roger's goods 10 km to a cold store in Hayle. At 5.30 the following morning Roger collects the order from his cold store and starts delivering to customers. This normally takes until 1.30 in the afternoon, but on Fridays he spends more time collecting money and often finishes after 5.00 pm.

There are several specific problems facing Ace Dairies. There is, for example, some variation in daily demand, so Roger has to carry spare stock. He cannot carry too much, as dairy products have a short life and anything not delivered quickly is thrown away. Roger aims at keeping this waste down to 2 per cent of sales. There are also problems maintaining a service during holidays, or when Unigate has difficulties with their deliveries.

Perhaps Roger's main concern is maintaining his sales over the long term. Demand for doorstep deliveries is declining, as people buy more milk at supermarkets. The number of milkmen in Hayle has declined from ten in 1987 to three in 2002. Most of Roger's customers have been with him for many years, but he generates new custom by canvassing, delivering leaflets, special offers, carrying a range of other products, and so on.

Answer the questions.

1. Describe the supply chain for milk. 2. Where does Ace Dairies fit into this? 3. What specific activities form the logistics in Ace Dairies? 4. What are the main problems that Ace Dairies has with logistics?

Worked Example 1

JL Francisco & Partners run a wholesale fruit business around Rio del Plata. In normal circumstances the company makes a gross profit of 5% of sales. A consultant's report has recently suggested that 22% of their operating costs are due to logistics, and that improved efficiency might reduce this by 10%. How much extra profit would this generate? If they do not improve logistics, how much would sales have to rise to get the same increase in profit?

Unit 4. INTEGRATING ALONG THE SUPPLY CHAIN

Text 1. Improving Communications

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Challenge, obvious change, satellite tracking of lorries, automatic guidance systems, generate, invoice, time-consuming, be worth, rather than, enter information, electronic data interchange, order processing system, worldwide, associate, debit, loop, arrange payment.

Ex. 2. Read the text and do the tasks that follow.

Logistics continually meets new challenges, and is changing faster now than at any time in the past. Perhaps the most obvious change is the increasing use of technology. Some of this appears directly in the movement of goods – such as electronic identification of packages, satellite tracking of lorries and automatic guidance systems – but the greatest impact has come with communications.

When a company wants to buy something, it typically has to generate a description of the goods, request for price, purchase order, order confirmation, contract terms, shipping papers, financial arrangements, delivery details, special conditions, invoices, and so on. In the past, all of these – and mountains of other paperwork – had to be printed and posted between organizations. This could make even a simple transaction seem complicated and time-consuming. Telephones did not help much, as Sam Goldwyn pointed out, 'a verbal contract isn't worth the paper it's written on'.

In the past few years technology has revolutionized these communications. Initial progress came with fax machines that could send electronic copies of documents between distant locations in seconds rather than days. The drawback with fax machines is that documents produced by one computer still have to be printed, fed into a fax machine, transmitted over telephone lines to someone else who reads the text and enters the information to their own computer.

By the 1990s the obvious next step had arrived with electronic data interchange (EDI). This allowed remote computers to exchange data without going through any intermediaries. Early users were supermarkets who linked their stock control systems directly to suppliers' order processing systems. The supermarket checkouts recorded sales of each item, and when stocks got low the system automatically sent a message asking for another delivery. This use of EPOS – electronic point-of-sales data – gave less paperwork, lower transaction costs, faster communications, fewer errors, more integrated systems, and closer business relations.

By 1997 about 2000 companies in the UK used EDI for trade with suppliers. Over the next few years electronic trading became more sophisticated and widespread. The mushrooming of e-mail was followed by all kinds of e-business, e-commerce – and soon 'e-anything'. The efficient transfer of information has been particularly useful for purchasing, which has developed into e-purchasing or e-procurement. This comes in many forms, all based on the direct exchange of data between a supplier's computer and a customer's. Two main versions are B2B (business-to-business, where one business buys materials from another business) and B2C (business-to-customer, where a final customer buys from a business). By 2002 around 83 per cent of UK suppliers used B2B, and the worldwide value of B2B trade was over US$2 trillion.

Two associated technologies have developed to support EDI. The first is item coding, which gives every package of material moved an identifying tag. The tag is usually a bar code or magnetic stripe that can be read automatically as the package moves through its journey. Then the logistics system knows where every package is at any time, and automatic materials handling can move, sort, consolidate, pack and deliver materials.

The second technology is electronic fund transfer (EFT). When the delivery of materials is acknowledged, EFT automatically debits the customer's bank account and credits the supplier's. This completes the loop, with EDI to place orders, item coding to track the movement, and EFT to arrange payment.

Ex. 3. *Answer the questions.*

1. Why is logistics changing faster now? 2. Where can the most obvious change be seen? 3. What must a company do if it intends to buy something? 4. How was all this information concerning the purchase of goods processed in the past? 5. What technological changes have taken place recently? 6. What developments marked the beginning of 1990ies? 7. What changes were observed in about 2000 UK companies by 1997? 8. What technologies were developed to keep up EDI?

Ex. 4. *Find English equivalents.*

Отвечать на новые вызовы, все возрастающее использование технологии, автоматическая система управления, электронная идентификация пакетов, давать описание, условия контракта, простая сделка, устный контракт, недостаток, вводить информацию, удаленный копьютер, обмен данными, передача информации, идентифицирующий ярлык, штрих-код, подтверждать, кодирование отдельного товара, урегулировать оплату.

Ex. 5. *Expand on the following statements from the text.*

1. Logistics continuously meets new challenges. 2. In the past a company had to generate mountains of paperwork. 3. The arrival of electronic data interchange marked a new stage in improving communications. 4. After 1997 electronic trading became more sophisticated and widespread. 5. Two related technologies were developed to support EDI.

Ex. 6. *Work in pairs. Describe measures that are taken to improve communications.*

Text 2. Improving Customer Service

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Remain competitive, affect, comparable, obviously, maintain a service level, be willing, different circumstances, synchronize, personalize, customization, virtual integration, volume, flexible, company.

Ex. 2. Read the text and do the tasks.

It is normally in everyone's interests to make logistics costs as low as possible. Logistics managers want low costs so that they remain competitive, and their users want to pay as little as possible. Many organizations have reduced their logistics costs to levels that affect their whole operations. Lower transport costs, for example, make it feasible to sell products over a wider geographic area. The cost of transport for, say, Japanese manufacturers is so low that they can offer goods at prices that are comparable to those offered by domestic companies. Similarly, efficient transport can move products quickly over long distances, so there is no need to build traditional warehouses close to customers.

While striving for lower costs, organizations obviously have to maintain their service levels. Improved logistics means giving the service that customers want at the lowest possible cost. A problem, of course, is finding the features that customers really want and the level of service they are willing to pay for. These vary widely in different circumstances, but a key factor is the lead time. This is the total time between ordering materials and having them delivered and available for use. Again, it is normally in everyone's interest to make this delay as short as possible. When customers decide to buy something, they want it delivered as soon as possible; suppliers want to keep customers happy with fast service, and with no products hanging around and clogging the supply chain. Ideally, the lead time should be as close to zero as possible, and one approach to this uses synchronized material movement. This makes information available to all parts of the supply chain at the same time, so that organizations can coordinate material movements, rather than wait for messages to move up and down the chain.

Another key factor for customer satisfaction is personalized products. Instead of buying a standard textbook, for example, you describe the contents you want and a publisher supplies a volume with exactly these specifications. This is mass customization, which combines the benefits of mass production with the flexibility of customized products. It uses B2C to give direct communications between a final customer and a manufacturer, and it needs supply chains that are flexible, that move materials very quickly, and respond to varying conditions.

Dell Computers was one of the first companies to use mass customization. They do not build standard computers, but wait until a customer places an order on their website. Then they build a computer for the specific order. Logistics makes sure that the necessary materials are always available for manufacturing, and it delivers the finished machine quickly to the customer.

Dell work so closely with their suppliers that they have developed 'virtual integration', where they all seem to be part of the same company. This works well with Dell, who have 50 main components, but would it work with a car manufacturer and their three thousand components? Flexible manufacturing here would put severe

pressures on the supply chain, but the '3DayCar Programme' suggests that 80 per cent of cars in the UK could be built to order by 2010.

Ex. 3. *Derive nouns from the following adjectives.*

Competitive, feasible, comparable, efficient, obvious, willing, available, possible, synchronized, exact, flexible, customized, varying, specific, necessary, close, virtual, same, maintain, severe.

Ex. 4. *Answer the questions.*

1. What is the man aim of logistics managers? 2. What is logistics users' goal? 3. What do lower transport costs help to achieve? 4. Maintaining their service levels should be provided while striving for lower costs, shouldn't it? 5. What is the key factor in improving logistics? 6. What lead time do they have to strive for? 7. What is a personalized product? 8. What formula is used to describe the direct correspondence between a final customer and a manufacturer? 9. What company was the first to use mass customization? 10. How did they achieve this? 11. What is 'vertical integration'?

Ex.5. *Expand on the following statements from the text.*

1. It is in everyone's interest to make logistics costs as low as possible. 2. Wile lowering logistics costs, organisations have to maintain their service levels. 3. Personalized products is another key to customer satisfaction. 4. Dell Computers was one of the first to use mass customization.

Ex. 6. *Work in pairs. Describe the ways to improve customer service.*

Text 3. Other Significant Logistics Trends

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Emphasis, mean, competitor, be likely, restrict, free trade, removal of import quotas and trade barriers, look for competitors, unit production cost, encourage, expenditure, postponement, dye, yarn, sweater, cross-docking, quantity, drop-shipping, access, vendor, courier, consumption, recognize.

Ex.2. *Read the text and do the tasks.*

Apart from increasing technology and emphasis on customer satisfaction, there are several other important trends in logistics. The following list includes some of the most significant.

◊ *Globalization:* Improved communications and better transport mean that physical distances are becoming less significant. Organizations can become global in outlook, buying, storing, manufacturing, moving and distributing materials in a single, worldwide market. As a result, international trade and competition are continuing to rise. Organizations used to look for competitors in the same town, but now they are just as likely to come from another continent.

Efficient logistics makes a global market feasible, and other factors that encourage international trade include less restricted financial systems, consumer demand for imported products, removal of import quotas and trade barriers and the growth of free trade areas. You can see the effects in manufacturing, where producers look for economies of scale in large facilities located in areas with low production costs. The unit production cost is low, and efficient logistics keeps the delivered price down. This is the reason why German companies open large plants in Poland, American companies work in Mexico and Japanese companies work in China.

◊ *Reduced number of suppliers:* In the past, organizations have used a large number of suppliers. This encouraged competition, ensured that they got the best deal and maintained secure deliveries if one supplier ran into difficulties. The current trend, however, is to reduce the number of suppliers and develop long-term relationships with the best. As we shall see later, working closely with a small number of organizations can bring considerable benefits.

◊ *Concentration of ownership:* Large companies can get economies of scale, and they have come to dominate many supply chains. There are, for example, many shops and transport companies – but the biggest ones continue to grow at the expense of small ones. The result is a continuing concentration of ownership, which you can see in many logistics sectors ranging from food wholesalers to cruise lines.

◊ *Outsourcing:* More organizations realize that they can benefit from using specialized companies to take over part, or all, of their logistics. Using a third party for materials movement leaves an organization free to concentrate on its core activities. M.C. McKinnon says that, 'Outsourcing has been one of the dominant business trends of the 1980s and 1990s' and surveys suggest that around 30 per cent of logistics expenditure is outsourced in the EU.

◊ *Postponement:* Traditionally, manufacturers move finished goods out of production and store them in the distribution system until they are needed. When there are many variations on a basic product, this can give high stocks of similar products. Postponement moves almost-finished products into the distribution system, and delays final modifications or customization until the last possible moment. You can imagine this with 'package-to-order', where a company keeps a product in stock, but only puts it in a box written in the appropriate language when it is about to ship an order.

Manufacturers of electrical equipment, such as Phillips and Hewlett-Packard, used to build into their products the transformers and plugs needed for different markets. Then they had to keep separate stocks of products destined for each country. Now they make the transformer and cables as separate, external units. They only keep stocks of the basic, standard products, and customize them for different markets by adding the proper transformers and plugs at the last minute. The result, of course, is much lower stocks. In the same way, Benetton used to dye yarn different colours, knit sweaters and keep stocks of each colour to meet varying demand. Now they knit sweaters with undyed yarn, keep much smaller stocks of these, and dye the finished sweaters to meet actual orders.

◊ *Cross-docking:* Traditional warehouses move materials into storage, keep them until needed, and then move them out to meet demand. Cross-docking co-ordinates the supply and delivery, so that goods arrive at the receiving area and are transferred straight away to a loading area, where they are put onto delivery vehicles. This dramatically reduces stock levels and associated administration.

There are two basic forms of cross-docking. In the first, packages are moved directly from arriving vehicles and onto departing ones. This does not really need a warehouse and a simple transfer point is enough. In the second form there is some additional work as materials arrive in larger packages which are opened, broken into smaller quantities, sorted, consolidated into deliveries for different customers and transferred to vehicles.

Cross-docking can develop to the point where nothing actually moves through a warehouse. Any stock is kept within vehicles, giving stock on wheels. A related arrangement uses drop-shipping, where wholesalers do not keep stock themselves, but co-ordinate the movement of materials directly from upstream suppliers to downstream customers. As warehousing is expensive and time-consuming, these methods can give much more efficient flows, and allow methods such as quick response and efficient customer response.

◊ *Direct delivery:* More customers are buying through the Web, or finding other ways of trading earlier in the supply chain, such as mail order or buying directly from manufacturers. This has the benefits of reducing lead times, reducing costs to customers, having manufacturers talking directly to their final customers, allowing customers access to a wider range of products, and so on. It also means that logistics has to move small deliveries quickly to final customers. This has encouraged the growth of couriers and express parcel delivery services such as FedEx, UPS and DHL.

◊ *Other stock reduction methods:* Keeping stock is expensive, so organizations continually look for ways of reducing the amount stored in the supply chain. There are many ways of doing this. One approach uses just-in-time operations to co-ordinate activities and minimize stock levels.

Another approach has vendor managed inventory, where suppliers manage both their own stocks and those held further down the supply chain. Improved co-ordination reduces overall costs and can give economies of scale.

◊ *Increasing environmental concerns:* There is growing concern about air pollution, water pollution, energy consumption, urban development and waste disposal. Logistics does not have a good reputation for environmental protection - demonstrated by the emissions from heavy lorries, use of green field sites for warehouses, calls for new road building, use of extensive packaging, ships illegally flushing their fuel tanks, oil spillages from tanker accidents, and so on.

On the positive side, logistics is moving towards 'greener' practices. Operators use more energy efficient vehicles, control exhaust emissions, reuse packaging, switch to environmentally friendly modes of transport, increase recycling through reverse logistics, add safety features to ships, develop brown-field sites, and so on. They increasingly recognize that careful management can bring both environmental

protection and lower costs. A fair assessment might be that logistics is making progress on environmental issues, but it has some way to go.

◊ *More collaboration along the supply chain:* Organizations in a supply chain increasingly recognize that they have the same objectives – which are satisfied final customers. They should not, therefore, compete with each other, but should co-operate to get final customer satisfaction. This is an important point. It means that competitors are not other organizations within the same supply chain, but are organizations in other supply chains. Christopher summarizes this by saying that 'supply chains compete, not companies'.

Ex. 3. *Answer the questions.*

1. What are other important trends in logistics apart from increasing technology and emphasis on customer satisfaction? 2. How does globalization tell on logistics? 3. What is the current tendency in relation to suppliers? 4. Concentration of ownership leads to the formation of economies of scale, doesn't it? 5. In what way does using a third party for material movement benefit organizations? 6. What does postponement help to achieve? 7. Cross-docking coordinates the supply and delivery, doesn't it? 8. What benefits does direct delivery give? 9. How is logistics moving towards 'greener' practices? 10. How can final customer satisfaction be achieved?

Ex. 4. *Expand on the following statements from the text.*

1. There are several other important trends in logistics apart from increasing technology expansion and customer satisfaction. 2. Globalization shortens physical distances between organizations. 3. Postponement moves almost finished products into the distribution system. 4. Cross-docking coordinates the supply and delivery. 5. There is a growing concern about environmental issues.

Ex. 5. *Work in pairs. Describe other significant trends that may help the integration along the supply chain.*

Text 4. Fragmented Logistics

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Unfortunately, come into conflict, frequent shortage, similarly, inevitably, run a department, fragmented, suppose, seamlessly, chance of error, emergency order, delay, disadvantage, obscure, remove boundaries, value enhancement, internal integration, ten extra units, rising demand, amplify.

Ex.2. *Read the text and do the tasks.*

A general overview of successive logistical operations within an organization represents a series of related activities that add value to the final product. These activities have traditionally been managed separately, so that an organization might have a distinct purchasing department, transport department, warehouse, distribution

fleet, and so on. Unfortunately, dividing up logistics in this way creates a number of problems.

Purchasing might look for the most reliable suppliers, inventory control for low unit costs, warehousing for fast stock turnover, materials management for easy handling, transport for full vehicle loads, and so on. These aims all seem worthy, so it might be sensible for each activity to judge its own performance in the most appropriate way. Unfortunately, we soon hit problems when the aims come into conflict. For example, warehousing might save money by reducing the stock of raw materials - but this leads to more frequent shortages and raises the costs of expediting for purchasing and emergency deliveries for transport. Similarly, purchasing can reduce its administrative costs by sending fewer, larger orders to suppliers – but this increases stock levels and raises the amount of money tied up in the warehouse. Using sea transport rather than airfreight reduces transport costs - but increases the amount of stock held in the supply chain. In reality, the different activities of logistics are very closely related, and policies in one part inevitably affect operations in another.

The problems at RP Turner are almost inevitable if logistics is divided into separate functions. Each part will move in a different direction, and there is duplicated effort and wasted resources. Imagine a wholesaler who has one fleet of vehicles run by materials management to bring materials in from suppliers, and a separate fleet run by distribution to deliver the same goods out to customers. This might work, but you can picture the duplicated effort and waste in managing two separate vehicle fleets. Another organization might have three stocks – raw materials, work in progress and finished goods – each run by different departments and using different standards and systems.

A fragmented supply chain also makes it difficult to co-ordinate the flow of information through different systems. Suppose a production department knows that it is running short of a material and needs a new delivery. This information should pass seamlessly to purchasing. If, however, it has to pass from one system to another there is a greater chance of error, uncertainty, delay and inefficiency – resulting in late delivery, emergency orders, expediting and shortages.

To put it briefly, fragmenting logistics into different parts has the disadvantages of:

- giving different, often conflicting, objectives within an organization duplicating effort and reducing productivity;
- giving worse communications and information flows between the parts;
- reducing co-ordination between the parts - leading to lower efficiency, higher costs and worse customer service;
- increasing uncertainty and delays along the supply chain making planning more difficult;
- introducing unnecessary buffers between the parts, such as stocks of work in progress, additional transport and administrative procedures;
- obscuring important information, such as the total cost of logistics giving logistics a low status within an organization.

We have described the benefits of integrating logistics within an organization. Now we can extend this argument, and suggest the same benefits for integrating logistics along more of the supply chain. If each organization only looks at its own operations, there are unnecessary boundaries between them, disrupting the flow of materials and increasing costs. External integration removes these boundaries to improve the whole chain. M. Christopher advises this move, saying that 'Most opportunities for cost reduction and/or value enhancement lie at the interface between supply chain partners'.

This effectively gives three levels of integration. The first has logistics as separate activities within an organization; the second has internal integration to bring them together into a single function; the third has external integration, where organizations look beyond their own operations and integrate more of the supply chain.

Organizations within the same supply chain should co-operate to get final customer satisfaction.
They should not compete with each other, but with organizations in other supply chains.

Forrester described one interesting effect of a fragmented supply chain. Imagine a retailer who notices that demand for a product rises by 5 units in a week. When it is time to place the next order, the retailer assumes that demand is rising, and orders ten extra units to make sure it has enough. The local wholesaler sees demand rise by ten units, so it orders an extra 15 units to meet the growth. The regional wholesaler sees demand rise by 15 units, so it orders another 20 units. As this movement travels through the supply chain, a relatively small change in final demand is amplified into a major variation for early suppliers.

Ex. 3. Answer the questions.

1. How do they manage the activities within an organization that add value to the final product? 2. Does this way of dividing up logistics contribute to better organization's performance? Why? 3. What kind of example does RP Turner give? 4. What happens if each part of a company works in isolation? 5. What are other drawbacks of fragmented supply chain? 6. Under what condition is there a greater chance of information error or delay? 7. What does this all result in? 8. What is the most important disadvantage of fragmented logistics that the above list gives? 9. What helps remove these boundaries? 10. Why does M. Forrester give his definition of a fragmented supply chain?

Ex. 4. Expand on the following statements from the text.

1. Related activities which give additional value to the final product of a company have been treated differently. 2. Aims of different parts of a company may come into a conflict. 3. Dividing logistics into separate functions inevitably brings about problems. 4. A fragmented supply chain complicates the coordination of information flow.

Ex. 5. *Work in pairs. Describe all the problems that fragmented logistics brings with itself.*

Logistics in practice

RP Turner Corp.

RP Turner Corp. makes pipeline valves for the oil industry in western Canada. It buys materials from Japan, the USA and eastern Canada, manufactures valves in Edmonton, Alberta and ships the finished products to oil fields in the North.

The company grew by emphasizing the high quality of its products, which work reliably in the harsh weather conditions of the Arctic. Transport to remote customers is expensive, and in 2000 the company looked for ways of reducing the cost of logistics. It soon found that separate functions worked more or less independently. This was sometimes all too obvious when the three main departments - Marketing, Production and Finance - were in different locations. Production was in Edmonton, as the nearest major city to the oil fields; Marketing was in Calgary near to oil company headquarters; Finance (including procurement) was in Vancouver near the port and financial centre. To appreciate the potential problems, you have to remember that Canada is a big country, so Production was a thousand kilometres away from Finance, 500 km away from Marketing and over two thousand kilometres from delivery points.

The company was rewarding different departments for different types of performance. Not surprisingly, when the departments were asked for their priorities, they had different views.

Marketing wanted:

- high stocks of finished goods to satisfy customer demands quickly
- a wide range of finished goods always held in stock
- locations near to customers to allow delivery with short lead times
- production to vary output in response to customer orders
- emphasis on an efficient distribution system
- an optimistic sales forecast to ensure production was geared up for actual demand.

Production wanted:

- high stocks of raw materials and work in progress to safeguard operations
- a narrow range of finished goods to give long production runs
- locations near to suppliers so that they could get raw materials quickly
- stable production to give efficient operations
- emphasis on the efficient movement of materials through operations
- realistic sales forecasts that allowed efficient planning.

Finance wanted:

- low stocks everywhere

- few locations to give economies of scale and minimize overall costs
- large batch sizes to reduce unit costs
- make-to-order operations
- pessimistic sales forecasts that discouraged underused facilities.

Despite good communications, the company felt that it was too widely spread out. It decided to centralize operations at its main plant in Edmonton. This brought the logistics functions geographically closer together, and major reorganization over the next two years brought a unified view of the supply chain.

Text 5. Integrating Activities

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Reach, obvious, avoid problems, a vital prerequisite, tackle a problem, overall benefit, develop over time, take over, artificial, essential, responsible for, obvious benefit, enthusiasm, considerable, authority, self-interest, logistics overheads, airfreight, expensive, transaction, benchmarking, identify, evolve.

Ex. 2. Read the text and do the tasks that follow.

The obvious way of avoiding these problems is to consider logistics not as a series of distinct activities, but as a single integrated function. Then all the parts work together to get the best overall result for the organization. This is why P. Sheehy, former chairman of BAT, could say, 'I believe that a well designed, integrated logistics system is a vital prerequisite for commercial success'.

Integrating logistics within an organization has all the related activities working together as a single function.

This is responsible for all storage and movement of materials throughout the organization.

It tackles problems from the viewpoint of the whole organization, and looks for the greatest overall benefit.

In practice, it is difficult to integrate all the logistics within an organization. The supply chain consists of many different activities, with different types of operation, using different systems and geographically dispersed. The usual approach has the integration developing over time. One department might slowly take over all aspects of ordering and receiving raw materials. Another department might slowly take over all aspects of delivering finished products to customers. Some organizations are tempted to stop when they reach this stage, and they work with two functions:

- *materials management,* aligned with production and looking after the inwards flow of raw materials and their movement through operations;
- *physical distribution,* aligned with marketing and looking at the outward flow of finished goods.

However, this still leaves an artificial break in what is essentially a continuous function. The obvious step is to combine the two into a single function responsible for all material movement into, through and out of the organization. This completes the internal integration of an organization's logistics.

Despite the obvious benefits of integrated logistics, there can still be practical difficulties. Perhaps the obvious one is finding someone with the knowledge, enthusiasm, ability and authority to carry through necessary changes. This needs a senior manager who has the necessary power to start the changes – with effects then percolating through all levels of the organization. New practices and relationships come from individuals working together, developing a culture that is based on teamwork and co-operation rather than self-interest and conflict.

Another factor that encourages internal integration is the analysis of total logistics cost. We can define this as:

total logistics cost = transport cost + warehouse cost + stock holding cost + packaging cost + information processing cost + other logistics overheads

The traditional view considered each of these separate costs as independent, so reducing, say, the transport cost automatically lowered the total cost. In the 1960s organizations began to take a 'systems' view of logistics, and analyze the interactions between activities. It became clear that reducing the cost of one activity increased the cost of another – and the total logistics cost might be reduced by increasing the amount spent on certain activities. H.T. Lewis gave an early example of this. They found that airfreight was much more expensive than alternative road transport, but faster delivery eliminated the need for local stocks and warehouses, and gave considerable overall savings.

One other important factor for integration is the availability of integrated information and control systems. Managers need a system to collect, store, analyze, distribute and present information ranging from the strategic aims of the organization down to details of each transaction. Most organizations use local networks or intranets for this, but the Internet is increasingly seen as an efficient route for logistics information. The information can be used by a control system that assesses current circumstances, makes decisions and implements the results. An information system might show that stocks are running low, and a control system uses this information to place an order with suppliers.

We have now described how logistics has moved from being a low priority, fragmented function, to a strategic, integrated one. This is a major change, which typically goes through the following stages:

Stage 1. Separate logistics activities are not given much attention or considered important.

Stage 2. Recognizing that the separate activities of logistics are important for the success of the organization.

Stage 3. Making improvements in the separate functions, making sure that each is as efficient as possible.

Stage 4. Internal integration – recognizing the benefits of internal co-operation and combining the separate functions into one.

Stage 5. Developing a logistics strategy, to set the long-term direction of logistics.

Stage 6. Benchmarking – comparing logistics' performance with other organizations, learning from their experiences, identifying areas that need improvement and finding ways of achieving this.

Stage 7. Continuous improvement – accepting that further changes are inevitable and always searching for better ways of organizing logistics.

By Stage 4 an organization has integrated logistics, and the last three stages show how the function can be improved. Stage 5 emphasizes the need for a strategic view, Stage 6 looks at other organizations for comparisons and lessons, and Stage 7 recognizes that logistics must continually evolve. However, this is not the end of the story. Once an organization has efficient, integrated and strategic logistics, it can start looking at integration along more of the supply chain.

Ex. 3. *Answer the questions.*

1. What is the main way of avoiding the disadvantages of fragmented supply chain? 2. What does a former BAT chairman think on this score? 3. Why is it difficult to integrate the organization's logistics? 4. What are the two functions within which organizations work? 5. What is the obvious step to eliminate a break between these two functions? 6. What are the essential difficulties of integrated logistics? How can they be overcome? 7. What measure can encourage internal integration? 8. How does the traditional view consider these costs? 9. How did the situation change in 1960ies? 10. Can you recall H.T. Lewis' example? 11. Why does a second important factor for integration acquire such an importance? 12. How many stages did logistics have to go on its way from fragmented to strategic integrated function? 13. What happens if an organization has boundaries between operations?

Ex. 4. *Expand on the following statements from the text.*

1. It is difficult to integrate all the logistics within an organization. 2. There still are practical difficulties in integral logistics. 3. Gradual change in the treatment of the traditional view on logistics costs. 4. The availability of integrated information and control systems is yet another important factor for integration. 5. The stages that describe the transition of logistics from being a low priority to acquiring a strategic function.

Ex. 5. *Work in pairs. Describe the circumstances that helped to work out a concept integrating logistics.*

Logistics in practice

International Business Systems

International Business Systems (IBS) is the largest international vendor of software for supply chain management. It is listed on the Stockholm Stock Exchange, but works internationally with more than 5000 customers in 40 countries. It was formed in 1969, and now has 2400 employees working in 90 offices.

IBS offer many software products including a range of fully integrated modules that improve performance of the supply chain. In other words, they provide the information and management controls for looking after 'the flow of goods and information in such a way that you give better customer service and achieve shorter lead times, with less capital tied up, thereby releasing resources for more profitable activities'.

The IBS system has modules based around core activities such as purchasing, distribution, sales, finance, production, and so on. These modules contain many different components for order processing, forecasting, sales analysis, Internet trading, bar coding, warehouse management, bar codes, inventory management, vendor managed inventory, spare part handling, customer supply chain helps organizations to manage relations management, after sales support, project management, and so on.

The aim of IBS is to give a sophisticated system that is comprehensive, but easy to run and use. Concise, well-presented and rapid information about all aspects of the their integrated logistics and 'puts them in control of the supply chain'.

Worked Example 3

In a simple supply chain, each organization holds one week's demand in stock. In other words, each buys enough materials from its suppliers to make its closing stock at the end of the week equal to the demand during the week. Demand for a product has been steady at 100 units a week. One week, demand from final customers is five units higher than usual. Assuming that deliveries are very fast, how does this affect movements in the supply chain?

Text 6. Benefits of Integration

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Brewery, joint, a margin of safety, genuine co-operation, due (to), more accurate forecasts, external, be reluctant, trust other members, quarter, sufficient trust, priority, achieve, benefit sb, adversary, get a good deal, lose out, assume, loyalty, objective, long-term interest, specific adjustments.

Ex. 2. *Read the text and do the tasks.*

Confederated Bottlers used to deliver bottles from their main plant in Elizabethville to a brewery in Johnston, 115 miles away. The brewery filled the bottles and took them to a distribution centre 20 miles outside Elizabethville. Both companies used their own trucks to deliver products, returning empty. Eventually, they formed a joint transport company that used the same trucks for both deliveries. Not surprisingly, the transport costs almost halved. This example shows one obvious benefit of integration, but there are many others.

Any uncertainty in the supply chain – such as the amplified variation of demand seen in the last example – encourages organizations to hold higher stocks to give themselves a margin of safety. These stocks increase costs and make the chain slow to react to changing conditions (when customers demand new products, all the stocks of old products in the supply chain have to be sold-on before the new ones appear). If you continue thinking along these lines, you find the following benefits from external integration:

- genuine co-operation between all parts of the supply chain, with shared information and resources;
- lower costs – due to balanced operations, lower stocks, less expediting, economies of scale, elimination of activities that waste time or do not add value, and so on;
- improved performance – due to more accurate forecasts, better planning, higher productivity of resources, rational priorities, and so on improved material flow, with co-ordination giving faster and more reliable movements;
- better customer service, with shorter lead times, faster deliveries and more customization;
- more flexibility, with organizations reacting faster to changing conditions
- standardized procedures, becoming routine and well-practiced with less duplication of effort, information, planning, and so on;
- reliable quality and fewer inspections, with integrated quality management programmes.

Many organizations have moved towards external integration and a survey by P-E Consulting in 1997 found that 57 per cent of companies had some form of integration of their supply chains. More than 90 per cent of companies expected further integration, with a quarter looking for 'fully integrated' systems (although there were clearly different opinions about what this meant).

The benefits of external integration may be clear, but there are many practical difficulties of achieving them. Many organizations simply do not trust other members of the supply chain, and they are reluctant to share information. Even with sufficient trust, there can be problems with different priorities, competition, data exchange, appropriate systems, skills, security, the complexity of systems, and so on. This raises the obvious question of how to achieve integration?

Normally, a supply chain consists of distinct organizations, each working for their own benefit. So why should they co-operate? Why should one company work to benefit another? The answer is that external integration brings benefits that can be shared among all members of the supply chain.

The first problem with external integration is overcoming the traditional view of organizations as adversaries. When an organization pays money to its suppliers, people assume that one can only benefit at the expense of the other. If the organization gets a good deal, it automatically means that the supplier is losing out: if the supplier makes a good profit, it means that the organization pays too much. This adversarial attitude has major drawbacks. Suppliers set rigid conditions and, as they have no guarantee of repeat business, they see no point in co-operation and try to

make as much profit from each sale as possible. At the same time, organizations have no loyalty, and they shop around to get the best deal and remind suppliers of the competition. Each is concerned only with their own objectives and will – when convenient to themselves – change specifications and conditions at short notice. The result is uncertainty about the number and size of orders, constantly changing suppliers and customers, changing products and conditions, different times between orders, no guarantee of repeat orders and changing costs.

To avoid these problems, organizations have to recognize that it is in their own long-term interest to replace conflict by agreement. This often needs a major change of culture. The following table suggests some specific adjustments.

Factor	Conflict view	Co-operation view
Profit	One organization profits at the expense of the other	Both share profits
Relationship	One is dominant	Equal partners
Trust	Little	Considerable
Communication	Limited and formal	Widespread and open
Information	Secretive	Open and shared
Control	Intensive policing	Delegation and empowerment
Quality	Blame for faults	Solving shared problems
Contract	Rigid	Flexible
Focus on	Own operations	Customers

Ex. 3. Answer the questions.

1. How did the Confederated Bottlers cooperate with a brewery in Johnstown? 2. Whose transport did they use to deliver their products? 3. Why do you think they formed a joint company? 4. What result did their effort bring about? 5. In what cases do companies try to give themselves a margin of safety? 6. What happens if customers demand new products? 7. What benefits can external integration bring? 8. What did the survey carried out by PE Consulting show? 9. What difficulties do organizations have to face on the way to external integration? 10. Why should companies overcome the traditional view of organizations as adversaries? How can they achieve this?

Ex. 4. Expand on the following statements from the text.

1. Trying to improve their logistics companies resort to various forms of integration. 2. Uncertainties in the supply chain force companies to build a margin of safety. 3. External cooperation brings benefits to each party. 4. There are many obstacles on the way to external integration.

Ex. 5. Work in pairs. Describe the benefits of external integration and practical difficulties of achieving them.

Logistics in practice

Perman Frère

Perman Frère is a small manufacturer based in Brussels. It exports most of its products and has a finished goods warehouse near the port of Ostende. Van Rijn is one of its customers, also based in Brussels. It imports most of its materials and has a raw materials warehouse near the port of Rotterdam.

The two companies have traded for many years and in 2001 they started looking for ways of increasing co-operation. It was soon obvious that they could make a number of small adjustments to improve logistics. As an example, some parts were made by Perman Frère in Brussels, sent to their warehouse in Ostende, delivered to van Rijn's warehouse in Rotterdam, and then brought back to Brussels. It was fairly easy to organize deliveries directly between the companies. This gave a much shorter journey across Brussels, reduced transport and handling costs, removed excess stocks, simplified administration, and reduced the lead time from five days to three hours. They also coordinated deliveries to towns in northern France, so that one vehicle could deliver time, but could not find any mechanism for products from both companies.

Both companies benefited from these changes. When they were introduced people in both companies said that they had been aware of the problems for a long overcoming them.

Text 7. Different Types of Cooperation

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Experience, valuable, agreed package sizes, make joint purchases, commitment, preferred suppliers, be obliged, partnership, informal arrangement, to supply, at a fixed price, impose, rigid conditions, long-term contract, to cover rising costs, neither, guarantee, common, supplier partnering, mutual, sharing of information, senior manager, fair pricing, specialize, quality service, implication, timetable, contribute, compatibility, facilitator, alliance, growing consensus.

Ex. 2. Read the text and do the tasks.

There are several ways that organizations can co-operate. They can, of course, simply do business together. If an organization has a good experience with a supplier, it will continue to use them and over some period will develop a valuable working relationship. Sometimes the cooperation is more positive, such as small companies making joint purchases to get the same quantity discounts as larger companies; EDI links to share information; combining loads to reduce transport costs; agreed package

sizes to ease material handling, lists of preferred suppliers, and so on. The key point with these informal arrangements is that there is no commitment. This is probably how you shop, as you have favourite shops but are not obliged to use them. Japanese companies take this approach further forming *Keiretsu* – which are groups of organizations that work together without actually forming partnerships.

An informal arrangement has the advantage of being flexible and non-binding. On the other hand, it has the disadvantage that either party can end the co-operation without warning, and at any time that suits them. This is why many organizations prefer a more formal arrangement, with a written contract setting out the obligations of each party. These are common when organizations see themselves as working together for some time. An electricity company, for example, might agree to supply power at a fixed price for the next three years, provided a customer buys some minimum quantity. More formal agreements have the advantage of showing the details of the commitment, so that each side knows exactly what it has to do. On the other hand, they have the disadvantage of losing flexibility and imposing rigid conditions. In 2001, for example, there were power cuts in California when electricity suppliers found that their long-term contracts with customers specified prices that were too low to cover the rising costs of generation.

When an organization and a supplier are working well together, they may both feel that they are getting the best possible results and neither could benefit from trading with other partners. Then they might look for a long-term relationship that will guarantee that their mutual benefits continue. This is the basis of a strategic alliance or partnership.

The supplier knows that it has repeat business for a long time, and can invest in improvements to products and operations; the organization knows that it has guaranteed - and continually improving – supplies. These arrangements are now common, and you often hear statements like 'Abbey National treats its suppliers as partners'. L.M. Ellram and D.R. Krause prefer the term 'supplier partnering' and give the following definition.

> *Supplier partnering is 'an ongoing relationship between firms, which involves a commitment over an extended time period, and a mutual sharing of information and the risks and rewards of the relationship.'*

The following list gives the main features of alliances:

- organizations working closely together at all levels
- senior managers and everyone in the organizations supporting the alliance
- shared business culture, goals and objectives
- openness and mutual trust
- long-term commitment shared information, expertise, planning and systems
- flexibility and willingness to solve shared problems
- continuous improvements in all aspects of operations
- joint development of products and processes
- guaranteed reliable and high quality goods and services
- agreement on costs and profits to give fair and competitive pricing

• increasing business between partners.

Partnerships can lead to changes in operations. For example, the stability of a partnership might encourage suppliers to specialize in one type of product. They give such a commitment to the alliance that they reduce their product range, make these as efficiently as possible, and concentrate on giving a small number of customers a very high quality service. They share information with customers without the threat that this will be used to get some form of trading advantage. At the same time, customers reduce their number of suppliers, as they no longer need to look around to get the best deals. Japanese companies were among the first to develop strategic alliances, and at the time when Toyota had formed partnerships with its 250 suppliers, General Motors was still working separately with 4000 suppliers.

It can be difficult to form a successful partnership. A useful starting point is to analyze current operations and future plans to see if alliances would be useful. A company cannot really expect any benefits from an alliance if it only buys a few materials, or is changing its manufacturing base, or is sensitive about confidentiality, or cannot find reliable suppliers. Most organizations, however, can see potential benefits, and they should start looking at possible arrangements. Typically they form a project team to identify potential partners, define objectives, set timetables, list resource implications, negotiate terms, and so on. When this project team makes its initial report, potential partners can be approached and negotiations begin. The following example shows how one company set about this.

Of course, forming a partnership is only the first step, and it still needs a lot of effort to make it a success. Some factors that contribute to a successful partnership include a high level of achieved service, real cost savings, a growing amount of business, compatibility of cultures, and so on. J. Rowley gave a more general list of key factors as management commitment, a contract specifying costs and responsibilities, agreed performance indicators, agreed objectives, shared culture and joint information systems. Lambert summarized these as:

■ *drivers*, which are the compelling reasons for forming partnerships, such as cost reduction, better customer service, or security;

■ *facilitators*, which are the supportive corporate factors that encourage partnerships, such as compatibility of operations, similar management styles, common aims, and so on;

■ *components*, which are the joint activities and operations used to build and sustain the relationship, such as communication channels, joint planning, shared risk and rewards, investment, and so on.

Alliances are certainly not the best answer in every circumstance. Some purchases are so small, or materials are so cheap, that the effort needed for an alliance is not worthwhile; sometimes managers do not want to lose control or share information; sometimes an organization may not be able to find a partner willing to make the necessary commitment; organizational structures or cultures may be too different; it may be impossible to reach the necessary level of trust; there may be nobody with the necessary skills and enthusiasm, and so on. Several years after

starting its supplier partnership initiative, Petro-Canada still bought 20-40% of materials through traditional supplier-customer relationships.

However, it is clear that alliances are becoming increasingly popular. As Ewer says, we have 'the powerful combination of improved technology which can enable better partnering, a growing consensus that partnering enabled by e-B2B is essential, and a growing public profile for partnering issues in general'.

Ex. 3. *Answer the questions.*

1. In what ways can companies cooperate? 2. Under what conditions can this cooperation bring better results? 3. What is the key point in this kind of informal arrangements? 4. How do Japanese companies use this approach? 5. What is the drawback of such informal arrangement? 6. What are the measures to make this arrangement more formal? 7. What is the basis for making a strategic alliance or partnership? 8. How is supplier partnering defined? 9. What are the main characteristics of alliances?

Ex. 4. *Expand on the following statements from the text.*

1. There are several ways for companies to cooperate. 2. No commitment is the main point of informal arrangements. 3. Disadvantages of informal arrangement. 4. A long-term relationship can be basis for making a strategic alliance. 5. Partnerships can lead to changes in operations. 6. It often involves certain difficulties to form a successful partnership. 7. Forming a partnership is the first step in strengthening cooperation between companies.

Ex. 5. *Work in pairs. Describe different ways in which organizations can successfully cooperate.*

Logistics in practice

Petro-Canada

Petro-Canada (PC) is the largest oil company in Canada, with 4500 employees and over $6 billion in sales. It owns 750 million barrels of proved reserves, but its main income comes from 1700 retail petrol stations. The Canadian government originally founded PC to compete with major international companies, and it still owns 18% of the shares.

In the 1990s PC started to form strategic alliances with its major suppliers. It was looking for ways of reducing costs, and supplier partnerships were a clear option for a company that spent over $2 billion a year on materials other than oil.

To find the best way of forming strategic alliances, PC benchmarked other companies who reported a history of successful partnerships, including Motorola and Dow Chemicals. In practice, growing pressure to improve performance meant that PC had to get results quickly, and they developed their own approach. This had targets of reducing costs by 15% in a first phase, and eventually by 25%.

PC quickly realized that without guaranteed product quality it could make no further progress, so it consolidated its use of total quality management. This included Deming's '14 principles' which advise organizations not to buy products on the basis of cost alone, but to include a range of factors such as quality, reliability, timing, features, trust, and so on.

Now it had done the preparation, PC could start talking to prospective partners. It chose these from companies that it currently did most business with, and those whose products were critical. There were already long-standing, informal relationships with many of these, and PC extended them to create more formal alliances. Important considerations were that the suppliers were committed to high quality, emphasized customer satisfaction, and had the potential to become 'the best of the best'.

This gave PC its likely partners, and the next stage was to form joint development teams, including representatives from the purchasing and user departments. Because of the time pressure, this team looked for quick improvements. Their aim was to get the initiative moving, get some quick returns, generate enthusiasm for the ideas, and then move the partnership forward over the longer term.

We can summarize PC's approach to developing partnerships in the following stages:

1. prepare the organization for alliances with research, training, systems and practices
2. assess the risk and benefits of partnerships, setting aims and targets
3. benchmark other partnership arrangements
4. select qualified suppliers
5. form joint teams to manage the initiative and move it forward
6. confirm the partnership's principles, commitments, relationships and obligations
7. formalize the terms and conditions
8. continue training and improving.

Text 8. Vertical Integration

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Go beyond partnership, own, minority share, joint venture, thinly, steel mill, canner, backward, desirable, necessarily, bake.

Ex. 2. Read the text and do the tasks.

If an organization wants to go beyond partnerships, it has to own more of the supply chain. One common arrangement has an organization taking a minority share in another company. This gives it some say in their operations, but it does not necessarily control them. A manufacturer, for example, might take a minority share in a wholesaler, to get some influence in the way that its products are distributed.

Another option is for two organizations to start a joint venture, where they both put up funds to start a third company with shared ownership. A manufacturer and supplier might together form a transport company for moving materials between the two.

The most common arrangement has one organization simply buying other organizations in the supply chain. This increases its level of vertical integration.

Vertical integration describes the amount of a supply chain that is owned by one organization.

If an organization buys materials from outside suppliers and sells products to external customers, it does not own much of the supply chain and has little vertical integration. If the organization owns initial suppliers, does most of the value adding operations, and distributes products through to final customers, it owns a lot of the supply chain and is highly vertically integrated. If the organization owns a lot of the supply side it has backward or upstream integration; if it owns a lot of the distribution network it has downstream or forward integration.

In some circumstances vertical integration is the best way of getting different parts of the supply chain to work together. Ford of America, for example, has at different times owned everything from steel mills through to distributor networks and repair shops. More often, widespread vertical integration would be very expensive, leading to huge organizations that spread their resources too thinly, needing specialized skills and experience that one organization does not have, reducing flexibility to respond to changing conditions, and so on. So vertical integration is not necessarily desirable, and it is usually impossible for even the biggest organization to own much of their supply chains. Heinz, for example, cannot buy all the farmers, processors, steel mills, canners, wholesalers, retailers and other organizations in the supply chain for their baked beans.

Ex. 3. *Answer the questions.*

1. What should companies do if they want to go beyond partnerships 2. What are the rights of an organization which has a minority share in another company? 3. What rights do companies enjoy if they set up a joint venture? 4. What is the most common arrangement of solving the problem of vertical integration? 5. What is vertical integration? 6. In what case does a company own a lot of the supply chain and is highly vertically integrated? 7. Is vertical integration in many cases the best way of making the supply chain parts work together? 8. What makes widespread vertical integration very expensive?

Ex. 4. *Expand on the following statements from the text.*

1. Vertical integration is one of the ways to go beyond partnerships. 2. Starting a joint venture is yet another option on this path. 3. Vertical integration means the amount of a supply chain which an organization owns. 4. Vertical integration helps bring different supply chain parts together. 5. Widespread vertical integration is quite expensive.

Ex. 5. Work in pairs. Describe the peculiarities of vertical integration.

Logistics in practice

GZ Rexam

In 1996 Rexam Pharmaceutical Packaging and Grafica Zannini formed a joint venture called GZ Rexam. Its primary aim is to supply packaging to the pharmaceutical industry in Europe. This is an important area, as over 50% of pharmaceutical companies' product recalls are caused by faults in printed material, and each recall costs several million pounds.

GZ Rexam looks for the benefits of partnerships with its customers. John Stevenson, the Sales and Marketing Director, says, 'The days of the conventional supply chain where everyone existed as an independent entity ... are no longer'. He quotes three reasons for partnerships:

■ Lower costs – due to better co-ordination, elimination of duplicated effort, less bureaucracy, quantity discounts, and economies of scale. GZ Rexam estimates that it can save up to 60% of packaging costs through partnerships.

■ Shorter lead-times – from improved coordination, procedures and administration. With Eli Lilly they reduced lead times from six to two weeks, with just-in-time deliveries for specific orders.

■ Higher quality – with uniform standards, collaboration in quality initiatives, less reliance on inspections and a commitment to long-term improvements.

Once the objectives of a partnership have been agreed, the two key factors for success at GZ Rexam are commitment to the long-term success of the partnership and good communication between everyone concerned.

C a s e S t u d y

Friedland Timbers asa

Johann Klassen is the Managing Director of Friedland Timbers asa. which makes specialized wood products for the construction industry. He has recently been worried by late deliveries to some important customers. The industry is very competitive, and Johann knows that customers will go to other suppliers if he cannot guarantee deliveries. The marketing manager is particularly upset because he has worked with these customers for a long time, and promised deliveries that were not made.

Johann asked the production manager for an explanation. She told him that 'Our own suppliers were late in delivering certain types of wood. This shortage of a key raw material disrupted our production plans. We cannot be blamed for this. If anyone in the company is to blame, it is the warehouse manager who does not keep enough stocks of raw materials to cover for late deliveries.'

Johann then went to the warehouse manager to see what was happening. 'There can't be anything wrong here', he was told. 'Stocks have been climbing for the past year, and last month they were at an all time high. In part, this is a deliberate decision, as I want to improve service levels to production. In part, though, stocks seem to have just drifted upwards. Now we have high stocks of most items, but there are still occasional shortages. These high stocks are causing me problems with space, and are stretching my budget. I think that the blame lies in purchasing, who do not order the amounts that we request.'

Johann saw that some stocks were drifting upwards because purchasing were buying large quantities of some materials. At the same time, they were delaying some purchases, and this produced the shortages. The purchasing manager explained to Johann, 'Let me remind you that eight months ago you instructed me to reduce materials costs. I am doing this by taking advantage of the discounts given by suppliers for larger orders. Often I order more than requested under the assumption that we will need the material at some stage, so I get a discount and the material is already in stock when we need it. Sometimes keeping things in stock would take too much space or be too expensive, so then I might delay an order until I can combine it with others to get bigger discounts.'

Johann thought that he was near the source of his problems, and might ask for the purchasing policies to be reviewed. Then he talked to the transport manager who was not so sure. 'It is much more efficient for me to bring larger quantities into the company', he said. 'If you reduce the average order size, the transport costs will rise. Our budget is already being squeezed, as we have to pay for expensive express deliveries of materials that production classify as urgent. If you lower the order size, there will be more shortages, more express deliveries and even higher costs.'

Johann talked to some major suppliers to see if they could somehow improve the flow of materials into the company. Unhappily, while he was talking to one company, they raised the question of late payments. This was contrary to Friedland's stated policy of immediate payment of invoices, so he asked the accounting section for an explanation. He was given the unwelcome news that 'The company's inventory and transport costs are so high that we are short of cash. We are delaying payments to improve our cash flow. As it is, we had to use a bank overdraft to pay suppliers for last month.

Later that day Johann found that the late customer deliveries which had started his investigation, were actually caused by poor sales forecasts by the marketing department. They had seriously underestimated demand, and planned production was too low. All the employees at FT were doing their best, but things seemed to be going wrong.

Answer the questions.

1. Why do all the logistics costs seem to be rising at the same time? 2. What do you think are the basic problems in Friedland? 3. What would you recommend Johann do?

Project

Supply Partnerships

Find a particular product whose supply chain is easy to study, such as petrol, a telephone service, cars, a restaurant chain, or a computer game. Discuss the amount of integration in the supply chain. What alternatives are there for integration? See if different organizations making similar products have the same approach, and explain any differences. Say why the existing patterns of logistics have developed, and discuss the benefits of this level of integration.

Unit 5. Warehousing

Text 1. Nature and Importance of Warehousing

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Warehousing, facility, garage, customer service, facet, requirement, inventory, allocation, consistent, consolidation, performance, phase, although, dispose, fluctuation, commensurate, multiple, shipment, breakbulk, short haul, long haul.

Ex. 2. Read the text and do the tasks.

Warehousing is an integral part of every logistics system. There are an estimated 750,000 warehouse facilities worldwide, including state-of-the-art, professionally managed warehouses, as well as company stockrooms, garages, self-store facilities, and even garden sheds. Warehousing plays a vital role in providing a desired level of customer service at the lowest possible total cost. Warehousing activity is an important link between the producer and the customer. Over the years, warehousing has developed from a relatively minor facet of a firm's logistics system to one of its most important functions.

We can define warehousing as that part of a firm's logistics system that stores products (raw materials, parts, goods-in-process, finished goods) at and between point of origin and point of consumption, and provides information to management on the status, condition, and disposition of items being stored. The term distribution center (DC) is sometimes used, but the terms are not identical. Warehouse is the more generic term.

Warehouses store all products, DCs hold minimum inventories and predominantly high-demand items. Warehouses handle most products in four cycles [receive, store, ship, and pick], DCs handle most products in two: receive and ship. Warehouses perform a minimum of value-added activity. DCs perform a high percentage of value adding, including possible final assembly. Warehouses collect data in batches, DCs collect data in real-time. Warehouses focus on minimizing the operating cost to meet shipping requirements, DCs focus on maximizing the profit impact of meeting customer delivery requirements.

With an increasing interest in improving inventory turns and reducing time to market, the role of distribution increasingly focuses on filling orders rapidly and efficiently.

Effective warehouse management involves a thorough understanding of the functions of warehousing, the merits of public versus private warehousing, and the financial and service aspects of warehousing decisions. Managers need knowledge of the methods that can improve warehousing performance and a strategy for locating warehousing facilities at optimal locations.

Warehousing decisions may be strategic or operational. *Strategic* decisions deal with the allocation of logistics resources over an extended time in a manner consistent and supportive of overall enterprise policies and objectives. They can take either long-range or project-type forms.

An example of a long-range strategic decision is the choice of a logistics system design. A project-type decision might deal with consolidation of branch warehouses into a regional distribution center. Other examples of typical strategic questions include the following:
Should warehousing be owned, leased, rented, or some combination of these? Should the warehousing functions be "spun off"; that is, contracted out to a third-party provider? Should the company install new materials handling equipment or continue to hire more labor?

Operational decisions are used to manage or control logistics performance. Typically, these decisions are routine in nature and involve time spans of one year or less. They relate to the coordination and performance of the logistics system. For example, a warehouse manager would be concerned with how to best utilize labor in the shipping department. Due to the short time horizon involved, these decisions have more certainty than strategic decisions.

Warehousing has traditionally provided storage of products (referred to as inventory) during all phases of the logistics process. Two basic types of inventories can be placed into storage: (1) raw materials, components, and parts (physical supply); and (2) finished goods (physical distribution). Warehousing has traditionally provided storage of products (referred to as inventory) during all phases of the logistics process. Two basic types of inventories can be placed into storage: (1) raw materials, components, and parts (physical supply); and (2) finished goods (physical distribution). Also, there may be inventories of goods-in-process and materials to be disposed of or recycled, although in most firms these constitute only a small portion of total inventories.

Traditionally, the warehousing of products has occured for one or more of the following reasons:

- Achieve transportation economies.
- Achieve production economies.
- Take advantage of quantity purchase discounts and forward buys.
- Maintain a source of supply.
- Support the firm's customer service policies.
- Meet changing market conditions (e.g., seasonality, demand fluctuations, competition). ◦ Overcome the time and space differentials that exist between producers and consumers. ◦ Accomplish least total cost logistics commensurate with a desired level of customer service. ◦ Support the just-in-time programs of suppliers and customers.
- Provide customers with a mix of products instead of a single product on each order. ◦ Provide temporary storage of materials to be disposed of or recycled (i.e., reverse logistics).

Warehouses can be used to support manufacturing, to mix products from multiple production facilities for shipment to a single customer, to breakbulk or subdivide a large shipment of product into many smaller shipments to satisfy the needs of many customers, and to combine or consolidate a number of small shipments into a single higher-volume shipment.

Warehousing is used increasingly as a "flow-through" point rather than a "holding" point, or even bypassed (e.g., scheduled deliveries direct to customers), as organizations increasingly substitute information for inventory, purchase smaller quantities, and use warehouses as "consolidation points" to receive purchased transportation rates and service levels.

The traditional method [of distribution] is a push system. Production plans are based on capabilities and capacities of the plant, and product is produced in the expectation that it will sell. When it is produced faster than it can be sold, it is stockpiled at plant warehouses. If sales cannot be accelerated, then the plant will be slowed down until supply moves into balance with demand. In this system, warehousing serves to absorb excess production. Today's pull system depends on information. It is based on a constant monitoring of demand. . . . With a pull system, there is no need for a reservoir. Instead, the warehouse serves as a flow-through center, offering improved service by positioning inventory closer to the customer.

In supporting manufacturing operations, warehouses often play the important role of inbound consolidation points for the receipt of shipments from suppliers. Firms order raw materials, parts, components, or supplies from various suppliers, who ship truckload (TL) or carload (CL) quantities to a warehouse located in close proximity to the plant. Items are transferred from the warehouse to the manufacturing plant(s).

From a physical distribution or outbound perspective, warehouses can be used for product mixing, outbound consolidation, or breakbulk. Product mixing often involves multiple plant locations (e.g., plant A, plant B, and plant C) that ship products (e.g., products A, B, and C) to a central warehouse. Each plant manufactures only a portion of the total product offering of the firm. Shipments are usually made in large quantities (TL or CL) to the central warehouse, where customer orders for multiple products are combined or mixed for shipment.

When a warehouse is used for outbound consolidation TL or CL shipments are made to a central facility from a number of manufacturing locations. The warehouse consolidates or combines products from the various plants into a single shipment to the customer.

Breakbulk warehouses are facilities that receive large shipments of product from manufacturing plants. Several customer orders are combined into a single shipment from the plants to the breakbulk warehouse. When the shipment is received at the warehouse, it is broken down into smaller LTL shipments which are sent to customers in the geographical area served by the warehouse. Breakbulk operations are sometimes carried out by using transportation innovations rather than warehousing.

Understanding the main points.

Ex. 3. Answer the questions.

1. What do warehouse facilities include? 2. How can you characterize the role of warehousing in a logistics system? 3. How is warehousing defined? 4. What is the difference between the terms 'distribution centre' and 'warehousing'? 5. What does effective management imply? 6. What decisions are made in warehousing? 7. Why do companies hold inventories in storage? 8. For what purposes can warehouses be used? 9. In what way does warehousing support manufacturing? 10. What does product mixing involve? 11. How is outbound consolidation realized? 12. How can you characterize breakbulk warehouses?

Ex. 4. Expand on the following statements from the text.

1. Warehousing is an integral part of every logistics system? 2. 'Distribution centre' and 'warehousing' are not identical terms. 3. Warehousing decisions may be strategic and operational. 4. Warehousing of products occurs for different reasons. 5. Warehousing can be used to support manufacturing, to mix products, to break a large shipment.

Ex. 5. Work in pairs. Describe the essence and importance of warehousing in modern conditions.

Text 2. Types of Warehousing

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Provide, acceptable, emphasize, efficient, accurate, goal, delivery, damage, verification, putaway, transfer, paramount, commonplace, approximately, eliminate, immediately, physically, pallet, permanent, replenishment, erratic, simultaneously, administer, utilization, personnel, accuracy, automate, completion, previous, perform, inefficiency, excessive, obsolete, routine, precise, vital.

Ex. 2. Read the text and do the tasks.

In general, firms have a number of warehousing alternatives. Some companies may market products directly to retail customers (called direct store delivery), thereby eliminating warehousing in the field. Mail-order catalog companies, for example, utilize warehousing only at a point of origin, such as sales headquarters or plant.

Another alternative is to utilize ***cross-docking*** concepts, whereby warehouses serve primarily as 'distribution mixing centers.' Product arrives in bulk and is immediately broken down and mixed in the proper range and quantity of products for customer shipment. In essence, the product never enters the warehouse.

Cross-docking is becoming popular among retailers, who can order TL, then remix and immediately ship to individual store locations. Products usually come boxed for individual stores from the supplier's location. For example, Laney & Duke, Hanes's third-party warehousing company in Jacksonville, Florida, tickets merchandise, places it on hangers, and boxes it up for individual Wal-Mart stores to replace items sold. The trailer leaves Jacksonville for the Wal-Mart DC where

product is cross-docked to trucks for stores. At stores, the boxes are opened and garments are immediately ready to hang on display racks.

Most firms warehouse products at some intermediate point between plant and customers. When a firm decides to store product in the field, it faces two warehousing options: rented facilities, called public warehousing, or owned or leased facilities, called private warehousing.

Another option exists, termed **contract warehousing**, which is a variation of public warehousing. Contract warehousing is an arrangement between the user and provider of the warehousing service. It has been defined as:

> ... *a long-term mutually beneficial arrangement which provides unique and specially tailored warehousing and logistics services exclusively to one client, where vendor and client share the risks associate with the operation. [There is a] focus on productivity, service and efficiency, not the fee and rate structure itself.*

Firms must examine important customer service and financial considerations to choose between public and private warehousing. For example, operating costs for a public warehouse tend to be higher because the warehouse will attempt to operate at a profit; it may also have selling and advertising costs. However, a firm makes no initial investment in facilities when it uses public warehousing. From a customer service perspective, private warehousing can generally provide higher service levels because of its more specialized facilities and equipment, and its better familiarity with the firm's products, customers, and markets.

The two options must be examined closely. In some instances, innovative public warehouses can provide higher levels of service owing to their expertise and strong competitive drive to serve the customer.

There are many types of public warehouses, including: (1) general merchandise warehouses for manufactured goods, (2) refrigerated or cold storage warehouses, (3) bonded warehouses, (4) household goods and furniture warehouses, (5) special commodity warehouses, and (6) bulk storage warehouses. Each type provides users with a broad range of specialized services.

The general merchandise warehouse is probably the most common form. It is designed to be used by manufacturers, distributors, and customers for storing almost any kind of product.

Refrigerated or cold storage warehouses provide a temperature-controlled storage environment. They tend to be used for preserving perishable items such as fruits and vegetables. However, a number of other items (e.g., frozen food products, some pharmaceuticals, photographic paper and film, and furs) require this type of facility.

Some general merchandise or special commodity warehouses are known as *bonded warehouses*. These warehouses undertake surety bonds from the U.S. Treasury and place their premises under the custody of an agent of the Treasury. Goods such as imported tobacco and alcoholic beverages are stored in this type of warehouse, although the government retains control of the goods until they are distributed to the marketplace. At that time, the importer must pay customs dudes to the Internal Revenue Service. The advantage of the bonded warehouse is that import

duties and excise taxes need not be paid until the merchandise is sold, so that the importer has the funds on hand to pay these fees.

Household goods warehouses are used for storage of personal property rather than merchandise. The property is typically stored for an extended period as a temporary layover option. Within this category of warehouses, there are several types of storage alternatives. One is the open storage concept. The goods are stored on a cubic-foot basis per month on the open floor of the warehouse. Household goods are typically confined to this type of storage. A second kind of storage is private room or vault storage, where users are provided with a private room or vault to lock in and secure goods. A third kind, container storage, provides users with a container into which they can pack goods. Container storage affords better protection of the product than open storage.

Special commodity warehouses are used for particular agricultural products, such as grains, wool, and cotton. Ordinarily each of these warehouses handles one kind of product and offers special services specific to that product.

Bulk storage warehouses provide tank storage of liquids and open or sheltered storage of dry products such as coal, sand, and chemicals. These warehouses may provide services such as filling drums from bulk or mixing various types of chemicals with others to produce new compounds or mixtures.

Understanding the main points.

Ex. 3. *Answer the questions.*

1. Are warehousing activities limited to storage only? 2. What are the aims of every logistics system? 3. What are the main warehousing functions? 4. What does movement function include? 5. How can a storage function be performed? 6. Information on inventory levels is vital to the operation of a warehouse, isn't it? 7. How can inefficiencies in warehousing operations be eliminated?

Ex. 4. *Expand on the following statements from the text.*

1. Warehousing plays an important part in a firm's logistics system. 2. Movement function is in the focus of improving inventory turns and speeding orders. 3. Storage is another important function of warehousing. 4. Information transfer is vital to the successful operation of a warehouse.

Ex. 5. *Work in pairs. Discuss the three important functions of warehousing operations.*

Text 3. Functions of Warehousing Operations

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Proper, standpoint, executive, disadvantages, contractual, amount, arrangement, conservation, requirement, flexibility, minimization, seasonality, constraint, expand, variation, assume, obsolete, nonlinear, administrative, association, quantity, carload, congestion, burden, necessitate, commitment, available, various,

substantial, currently, provision, precisely, compatible, occur, possession, feasible, expansion, facilitate, achieve, appropriate, intangible, permanence, associate, drawback, increase, decrease, adapt, customize, private, corporate-owned, advantageous, justify, insufficient, hundredweight, sufficiently.

Ex. 2. *Read the text and do the tasks.*

Warehousing serves an important role in a firm's logistics system. In combination with other activities, it provides the firm's customers with an acceptable level of service. The obvious role of warehousing is to store products, but warehousing also provides break-bulk, consolidation, and information services. These activities emphasize product flow rather than storage.

Fast and efficient movement of large quantities of raw materials, component parts, and finished goods through the warehouse, coupled with timely and accurate information about the products being stored, are the goals of every logistics system. These goals have received increasing attention from the top management of many organizations.

Warehousing has three basic functions: movement, storage, and information transfer. Recently, the movement function has been receiving the most attention as organizations focus on improving inventory turns and speeding orders from manufacturing to final delivery.

The movement function can be further divided into several activities, including: receiving; transfer or putaway; order picking/selection; cross-docking; shipping.

The *receiving* activity includes the actual unloading of products from the transportation carrier, the updating of warehouse inventory records, inspection for damage, and verification of the merchandise count against orders and shipping records.

Transfer or *putaway* involves the physical movement of the product into the warehouse for storage, movement to areas for specialized services such as consolidation, and movement to outbound shipment. Customer *order selection* or *order picking* is the major movement activity and involves regrouping products into the assortments customers desire. Packing slips are made up at this point.

Cross-docking bypasses the storage activity by transferring items directly from the receiving dock to the shipping dock. A pure cross-docking operation would avoid putaway, storage, and order picking. Information transfer would become paramount because shipments require close coordination.

Cross-docking has become commonplace in warehousing because of its impact on costs and customer service. For example, approximately 75 percent of food distribution involves the cross-docking of products from supplier to retail food stores. Eliminating the transfer or putaway of products reduces costs and the time goods remain at the warehouse, thus improving customer service levels.

Cross-docking should be considered as an option by firms meeting two or more of the following criteria:

- inventory destination is known when received.
- customer is ready to receive inventory immediately.
- shipment to fewer than 200 locations daily.

- daily throughput exceeds 2,000 cartons.
- more than 70 percent of the inventory is conveyable.
- large quantities of individual items received by firm.
- inventory arrives at firm's docks prelabeled.
- some inventory is time sensitive.
- firm's distribution center is near capacity.
- some of the inventory is prepriced.

Shipping, the last movement activity, consists of product staging and physically moving the assembled orders onto carrier equipment, adjusting inventory records, and checking orders to be shipped. It can consist of sortation and packaging of items for specific customers. Products are placed in boxes, cartons, or other containers, placed on pallets, or shrinkwrapped (i.e., the process of wrapping products in a plastic film), and are marked with information necessary for shipment, such as origin, destination, shipper, consignee, and package contents.

Storage, the second function of warehousing, can be performed on a temporary or a semi-permanent basis. Temporary storage emphasizes the movement function of the warehouse and includes only the storage of product necessary for basic inventory replenishment. Temporary storage is required regardless of the actual inventory turnover. The extent of temporary inventory storage depends on the design of the logistics system and the variability experienced in lead time and demand. A goal of cross-docking is to utilize only the temporary storage function of the warehouse.

Semi-permanent storage is the storage of inventory in excess of that required for normal replenishment. This inventory is referred to as buffer or safety stock. The most common conditions leading to semi-permanent storage are (1) seasonal demand, (2) erratic demand, (3) conditioning of products such as fruits and meats, (4) speculation or forward buying, and (5) special deals such as quantity discounts.

Information transfer, the third major function of warehousing, occurs simultaneously with the movement and storage functions. Management always needs timely and accurate information as it attempts to administer the warehousing activity. Information on inventory levels, throughput levels (i.e., the amount of product moving through the warehouse), stock-keeping locations, inbound and outbound shipments, customer data, facility space utilization, and personnel is vital to the successful operation of a warehouse. Organizations are relying increasingly on computerized information transfer utilizing electronic data interchange (EDI) and bar coding to improve both the speed and accuracy of information transfer.

In spite of numerous attempts by firms to reduce the flow of paperwork, the amount of paperwork is still significant. For this reason and many others, management in many firms has attempted to automate the clerical function whenever possible. The developments in electronic communications have been instrumental in reducing the clerical activities in all aspects of warehousing.

Successful completion of all of the warehousing activities already mentioned eliminates the need for checking. However, errors and mistakes do occur within any warehouse operation, usually making it necessary to conduct a check of previous activities. In some instances, this activity can be minimized in operations where

employees are empowered to perform quality control at their respective levels within the warehouse. This activity may be performed by teams, instead of individuals.

It is important to eliminate any inefficiencies in movement, storage, and information transfer within the warehouse. These can occur in a variety of forms:

- Redundant or excessive handling.
- Poor utilization of space and cube.
- Excessive maintenance costs and downtime due to obsolete equipment.

Dated receiving and shipping dock conditions.

- Obsolete computerized information handling of routine transactions.

The competitive marketplace demands more precise and accurate handling, storage, and retrieval systems, as well as improved packaging and shipping systems. It is vital for a warehouse operation to have the optimal mix of manual and automated handling systems.

Understanding the main points.

Ex. 3. Answer the questions.

1. What is one of the most crucial decisions that any company has to take? 2. What may help logistics executives to make the right decision? 3. What are the advantages of public warehousing? 4. What are the disadvantages of public warehousing? 5. What are the advantages of private warehousing? 6. What are the disadvantages of public warehousing?

Ex. 4. Expand on the following statements from the text.

1. One of the most important warehousing decisions is to decide what kind storage facilities to use. 2. Public warehousing has a number of benefits. 3. Disadvantages associated with the use of public warehousing are not so numerous compared to advantages. 4. Private warehousing present certain benefits to a company. 5. Alongside with advantages private warehousing is associated with a number of disadvantages.

Ex. 5. Work in pairs. Describe the advantages and disadvantages of public and private warehousing.

Text 4. Facility Development

Ex. 1. Before reading the text check the meaning of the following words and word combinations in the dictionary.

Determine, maximize, measure, footage, dimension, capability, aisle, require, illustrate, affect, utilization, counterbalance, turret, alternative, perspective, fluctuate, unpredictable, hypothetical, requirement, accommodate, simulate, wholesale, extremely, lease, eventually, curve, quantity, schedule, dissemination, sourcing, pinpoint.

Ex. 2. Read the text and do the tasks.

One of the more important decisions a logistics executive faces is how to develop an optimal warehousing network for the firm's products and customers. Such a decision encompasses a number of significant elements. Management must

determine the size and number of warehouses, and ascertain their location. Each warehouse must be laid out and designed properly in order to maximize efficiency and productivity.

Two issues that must be addressed are the size and number of warehouse facilities. These are interrelated decisions because they typically have an inverse relationship; that is, as the number of warehouses increases, the average size of a warehouse decreases.

Many factors influence how large a warehouse should be. First, it is necessary to define how size is measured. In general, size can be defined in terms of square footage or cubic space. Most public warehouses still use square footage dimensions in their advertising and promotional efforts.

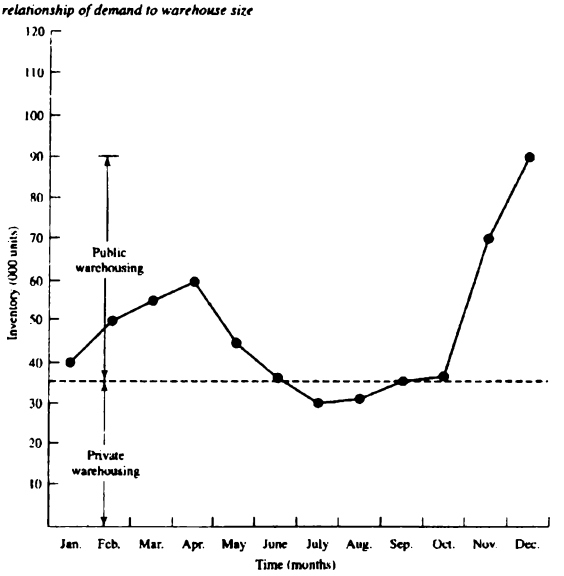
Unfortunately, square footage measures ignore the capability of modern warehouses to store merchandise vertically. Hence, the cubic space measure was developed. Cubic space refers to the total volume of space available within a facility. It is a much more realistic size estimate than square footage because it considers more of the available usable space in a warehouse. Some of the most important factors affecting the size of a warehouse are:

Customer service levels.
Size of market or markets served.
Number of products marketed.
Size of the product or products.
Materials handling system used.
Throughput rate.
Production lead time.
Economies of scale.
Stock layout.
Aisle requirements.
Office area in warehouse.
Types of racks and shelves used.
Level and pattern of demand.

As a company's service levels increase, it typically requires more warehousing space to provide storage for higher levels of inventory. As the market served by a warehouse increases in number or size, additional space is required. When a firm has multiple products or product groupings, especially if they are diverse, it needs larger warehouses to maintain at least minimal inventory levels of all products. In general, greater space requirements are necessary when products are large; production lead time is long; manual materials handling systems are used; the warehouse contains office, sales, or computer activities; and demand is erratic and unpredictable.

To illustrate, consider the relation of warehouse size to the type of materials handling equipment used.16 As Figure 1 shows, the type of forklift track a warehouse employs can significantly affect the amount of storage area necessary to store product. Because of different capabilities of forklift tracks, a firm can justify the acquisition of more expensive units when it is able to bring about more effective utilization of space.

Figure 1



The simplest type of forklift truck, the counterbalanced track, requires aisles that are 10 to 12 feet wide. At $30,000, it is the least expensive forklift. The turret truck requires aisles only 5 to 7 feet wide to handle the same amount of product, but it costs $65,000 or more. The warehouse decision maker must examine the cost trade-offs for each of the available systems, and determine which alternative is most advantageous from a cost-service perspective.

Demand also has an impact on warehouse size. Whenever demand fluctuates significantly or is unpredictable, inventory levels generally must be higher. This results in a need for more space and thus a larger warehouse. All the warehousing space need not be private. Many firms utilize a combination of private and public warehousing.

The hypothetical firm depicted in Figure 1 utilizes private warehousing to store 36,000 units of inventory. This results in full utilization of its facilities all year, with the exception of July and August. For months when inventory requirements exceed private warehousing space, the firm rents short-term storage space from one or more public warehouses. In essence, the firm develops private facilities to accommodate a maximum level of inventory of 36,000 units.

Inventory velocity (as measured by turnover) and the maximization of "direct deliveries" to customers (bypassing a regional or wholesaler's warehouse) can have a great impact on the size of a warehouse. Whirlpool Corporation developed a computer program to simulate these two characteristics, as well as the cubic warehousing space requirements of its total channel network, including wholesale distributors. The company calculated the square footage required for each of its

factory-controlled and wholesale warehouses. It added space to the base requirements of each of its major product categories in order to provide for aisles and docks, and unused (empty) vertical and horizontal storage bays. By manipulating planned sales volumes, inventory turns, and orders shipped directly to dealers, Whirlpool was able to accurately project future warehousing needs.

Four factors are significant in deciding on the number of warehousing facilities: cost of lost sales, inventory costs, warehousing costs, and transportation costs. Although lost sales are extremely important to a firm, they are the most difficult to calculate and predict, and they vary by company and industry. If the cost of lost sales appeared in Figure 2, it would generally slope down and to the right. The degree of slope, however, would vary by industry, company, product, and customer.

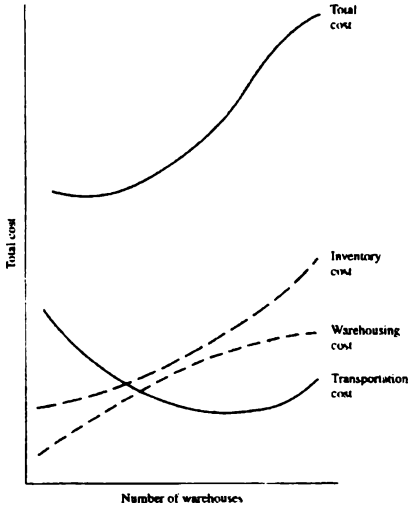
Inventory costs increase with the number of facilities because firms usually stock a minimum amount (e.g., safety stock) of all products at every location, although some companies have specific warehouses dedicated to a particular product or product grouping. This means that both slow and fast turnover items are stocked; thus, more total space is required.

Warehousing costs increase, because more warehouses mean more space to be owned, leased, or rented, but they decrease after a number of warehouses are brought on-line, particularly if the firm leases or rents space. Public and contract warehouses often offer quantity discounts when firms acquire space in multiple locations.

Transportation costs initially decline as the number of warehouses increase, but they eventually curve upward if too many facilities are employed owing to the combination of inbound and outbound transportation costs. A firm must be concerned with the total delivered cost of its products, not simply the cost of moving products to warehouse locations. In general, the use of fewer facilities means lower inbound transport costs due to bulk shipments from the manufacturer or supplier.

Figure 2

Relationship between total logistics cost and the number of warehouses



After the number of warehouses increases to a certain point, the firm may not be able to ship its products in such large quantities and may have to pay a higher rate to the transportation carrier. Local transportation costs for delivery of products from warehouses to customers may increase because of minimum charges that apply to local cartage.

If the cost of lost sales is not included, the slopes shown in Figure 2, taken together, indicate that fewer warehouses are better than many warehouses. However, customer service is a critical element of a firm's marketing and logistics systems. In general, if the cost of lost sales is very high, a firm may wish to expand its number of warehouses or use scheduled deliveries. There are always cost-service trade-offs. Management must determine the optimal number of warehouses given the desired customer-service level.

Value of Computers. Computers can help minimize the firm's number of warehouses by improving warehouse layout and design, inventory control, shipping and receiving, and the dissemination of information. Coupled with more efficient warehouses, the substitution of information for inventories tends to reduce the number of warehouses needed to service a firm's customers. In essence, the more responsive the logistics system, the less need there is for warehousing.

Location Analysis. Where would be the best place to build a warehouse that would service the greatest number of U.S. consumers? Bloomington, Indiana, would be closer, on average, to the U.S. population than any other location. If a firm wished to locate facilities closest to its potential customers, using one or more warehouses in their logistics network, a number of sites would be possible.

The site-selection decision can be approached from macro and micro perspectives. The macro perspective examines the issue of where to locate warehouses geographically within a general area so as to improve the sourcing of materials and the firm's market offering (improve service and/or reduce cost). The micro perspective examines factors that pinpoint specific locations within the large geographic areas.

Macro Approaches. In one of the best-known macro approaches to warehouse location, Edgar M. Hoover, an American location theorist, identified three types of location strategies: (1) market positioned, (2) production positioned, and (3) intermediately positioned. The market-positioned strategy locates warehouses nearest to the final customer. This maximizes customer service levels and enables a firm to utilize transportation economies — TL and CL shipments — from plants or sources to each warehouse location.

The factors that influence the placement of warehouses near the market areas served include transportation costs, order cycle time, the sensitivity of the product, order size, local transportation availability, and levels of customer service offered.

The *production-positioned strategy* locates warehouses in close proximity to sources of supply or production facilities. These warehouses generally cannot provide the same level of customer service as market-positioned warehouses; instead, they serve as collection points or mixing facilities for products manufactured at a number of different plants.

For multiproduct companies, transportation economies result from consolidation of shipments into TL or CL quantities. The factors that influence the placement of warehouses close to the point of production are perishability of raw materials, number of products in the firm's product mix, assortment of products ordered by customers, and transportation consolidation rates.

The *intermediately positioned strategy* places warehouses at a midpoint location between the final customer and the producer. Customer service levels are typically higher for intermediately positioned warehouses than they are for the production-positioned facilities and lower than for market-positioned facilities. A firm often follows this strategy if it must offer high customer service levels and if it has a varied product offering manufactured at several plant locations.

Understanding the main points.

Ex. 3. *Answer the questions.*

1. Developing an optimal warehousing network is one f the most important decisions for logistics executives, isn't it? 2. What factors influence the size of a warehouse? 3. What factors affect a warehouse size? 4. Why may a company need additional warehousing space? 5. How is a warehousing size related to the materials handling equipment used? 6. How do fluctuations in demand affect a warehouse size? 7. What factors influence the number of warehouses? 8. Where is the best place to locate a warehouse? 9. What are the sight selection factors from a micro perspective? 10. What are the benefits of a good warehouse layout?

Ex. 4. *Expand on the following statements from the text.*

1. Developing an optimal warehousing network is one f the most important decisions for logistics executives. 2. Warehousing size may be defined in terms of square footage or cubic space. 3. Warehousing size is related to the materials handling equipment used. 4. Demand fluctuations impact a warehouse size. 5. Four factors influence the number of warehouses. 6. Factors to be considered when choosing the best place to locate a warehouse. 7. The intermediately positioned strategy places warehouses at a midpoint location between the final customer and a producer.

Ex. 5. *Work in pairs. Describe how an optimal warehousing network can be developed.*

Text 5. Improving Warehouse Productivity and Financial Dimensions

Ex. 1. *Before reading the text check the meaning of the following words and word combinations in the dictionary.*

Prior, multinational, preeminent, immense, intermediary, abundance, request, gain, utilization, performance, corrective, highlight, merely, contingency, institute, significant, impact, aware, alternative, obsolescence, router, retrieval, assess, frequently, assign, unbundle, sophistication, aggregate, categorize.

Ex. 2. Read the text and do the tasks.

Products must be stored at some point prior to their final consumption. Depending on the particular conditions in effect in each foreign market, products may be stored at different points within the channel of distribution.

In the European Union (EU), Philips, a large multinational electronics firm, must store and warehouse a variety of products at factories throughout Europe.

Philips has poured impressive sums into the establishment of superautomated international distribution centers, or "Eurostores," for each of its product divisions.

A typical Eurostore is that of Philips's Lighting Division, located in the Dutch city of Roosendaal. Its preeminent features are an immense high-bay warehouse and an all-encompassing computer system that runs the entire operation on an ORFO (order of forwarding) basis. The Eurostore is a study in quiet, rhythmic efficiency, with human management evident only at critical monitoring locations.

If a firm is involved in exporting, it may store items domestically and ship them only after it receives orders. Thus, no foreign storage is necessary.

If distributors or other intermediaries are used, inventories will have to be stored or warehoused at other locations within the channel. The ability of the manufacturer or supplier to push the inventory down the channel of distribution varies from market to market, depending on the size of the channel intermediaries, customer inventory policies, demand for the product by final consumers, storage costs, and customer service levels necessary to serve each market.

In Japan and most European countries, the retail network is composed of a great number of small shops, each having little capacity for inventory storage. As a result, these shops order frequently from distributors, manufacturers, or other channel intermediaries. The burden of storage is carried by the manufacturer or other channel members instead of by the retailer. In the United States, where retail stores are fewer in number but much larger, the storage function is more easily shifted from the channel intermediaries directly to the retailer.

When an international firm needs warehousing facilities in a foreign market, it may find an abundance of sophisticated, modern warehouses in some industrial nations. In Japan, for example, many companies use high-cube automated warehousing. On the other hand, storage facilities in many developing countries may be nonexistent or limited in availability or sophistication. In the latter instance, the product package or shipping container may have to serve the warehousing purpose. Third-party providers such as CTI, Exel, GATX, and Ryder Integrated Logistics have begun operations in Latin America and Asia at the request of their North American customers.

In the United States, many public warehouses provide services such as consolidation and breakbulk, customer billing, traffic management, packaging, and labeling. Public warehouses in many foreign markets also may provide services in addition to storage.

Like all logistics activities, the warehousing and storage activity must be administered differently in each foreign market. The logistics executive is responsible

for recognizing how the storage activity differs and adjusting the firm's strategy accordingly.

To obtain maximum logistics efficiency, each component of the logistics system must operate at optimal levels. This means that high levels of productivity must be achieved, especially in the warehousing area. Productivity gains in warehousing are important to the firm in terms of reduced costs and to its customers in terms of improved customer service levels.

Productivity has been defined in many ways, but most definitions include the notions of real outputs and real inputs, utilization, and warehouse performance. One study defined those elements as follows:

► *Productivity is the ratio of real output to real input. Examples are cases handled per labor-hour and lines selected per equipment-hour.*

► *Utilization is the ratio of capacity used to available capacity. Examples are the percent of pallet spaces filled in a warehouse and employee-hours worked versus employee-hours available.*

► *Performance is the ratio of actual output to standard output (or standard hours earned to actual hours).* Examples are cases picked per hour versus standard rate planned per hour, and actual return on assets employed versus budgeted return on assets employed.

Any working definition of productivity probably includes all three components because they are interrelated. Most firms utilize a variety of measures. Firms tend to use more sophisticated productivity measures over time.

A multitude of warehouse productivity measures are used although they can be grouped into major categories such as labor cost per unit handled, amount of space needed to store each unit, and frequency of errors. Performance data must be available and used as the basis for corrective action and proactive improvement.

The general management notion that "you can't manage what you don't measure" is an important warehousing performance concept. Some of the most important areas of measurement that highlight problems or opportunities include customer service (e.g., shipping performance, error rates, order cycle time), inventory accuracy (e.g., the quantity of each SKU is correct at all warehouse locations), space utilization (e.g., having the right inventory, square foot or cube utilization of facilities), and labor productivity (e.g., throughput rates).

It is not enough to merely identify problem areas; rather, it is vital that the firm take appropriate actions to improve poor performance whenever possible. A company should develop decision strategies to handle most problem areas before the problems develop. This is the essence of contingency planning. Once issues are pinpointed, the firm can institute various controls or corrective actions to improve warehouse productivity.

Because warehousing is such a significant component of the logistics process in terms of its cost and service impacts, logistics executives are acutely aware of the need to improve warehouse productivity. Productivity can be improved in many ways, including methods-related, equipment-related, systems-related, and training/motivation-related programs.

Methods-related programs consider alternative processes for achieving desired results. They include those involving warehouse cube utilization, warehouse layout and design, methods and procedures analysis, batch picking of small orders, combined putaway/picking, wrap packaging, inventory cycle counting, product line obsolescence, standardized packaging, and warehouse consolidation.

Equipment-related programs include the use of new technology such as optical scanners, automatic labeling devices, computer generated putaway and pick lists, automated materials handling equipment, communications devices, computers and automated storage/ retrieval systems (AS/RSs), carousels, and conveyors. The Technology box shows how a grocery chain used a radio-frequency system to track its products.

Systems-related programs include the use of router/location systems, geographic or zone picking, and random location of products in the warehouse. These are systems related because they directly affect the way that different components of the logistics system interact.

Training/motivation-related programs include employee training, management development programs, work teams, incentive systems, and awards recognition. These programs can improve warehouse productivity by empowering those closest to the activity to make improvements in operations.

The preceding approaches can be implemented individually or in combination. Most firms utilize several methods simultaneously to improve warehouse productivity.

Financial control of warehousing is closely tied to logistics productivity and corporate profitability. Before the various activities of warehousing can be properly integrated into a single unified system, management must be aware of the risks and costs of each activity.

Many warehouse decisions involve risk. The risks can be of many types, but all eventually will result in some impact on costs or revenues. For example, making a capital investment in automated storage and retrieval systems increases both risk and the level of expected return on investment. Firms must be able to justify such investments financially. The more quickly the cost of the equipment can be recovered, the less risk associated with the decision. Financial accounting and control techniques are very important in assessing the risks and rewards associated with warehousing decisions.

One approach that has proven successful in the financial control of warehousing activities is activity-based costing (ABC). Accurate and timely financial data allow warehouse executives to properly plan, administer, and control warehousing activities. Traditional costing systems, in place at many firms, often do not provide financial data in the proper form for use in making warehousing decisions. Frequently, it is difficult to identify how warehousing costs impact overall corporate profitability and how changes in costs in one area affect costs in another. Some companies are implementing ABC in order to have better warehousing cost information.

With ABC, costs are determined by specific products, services, or customers. It utilizes a two-stage process. The first stage assigns resource costs according to the amount of each resource consumed in performing specific warehousing activities.

The second stage assigns warehousing activity costs to the products, services, or customers consuming the activities.

Proponents of ABC state that it unbundles traditional cost accounts and shows how resources are consumed.

Companies are often at various levels of sophistication in terms of warehouse accounting and control. Four levels have been identified:

Level I. Warehouse costs are allocated in total, using a single allocation base.

Level II. Warehouse costs are aggregated by major warehouse function (e.g., handling, storage, and administration) and are assigned using a separate allocation base for each function.

Level III. Warehouse costs are aggregated by major activity within each function (e.g., receiving, putaway, order pick) and are allocated using a separate base for each activity.

Level IV. Costs are categorized in matrix form, reflecting each major activity, natural expense, and type of cost behavior. Separate allocations are developed for each cost category, using bases that reflect the key differences in warehousing characteristics among cost objectives.

Accounting and control require having the right kind of financial data available when and where they are needed, and in a form that is usable by as many functional areas of the firm as possible. Ultimately, these data are essential to making the necessary cost-service trade-offs within the warehousing activity and between other logistics functions.

Understanding the main points.

Ex. 3. *Answer the questions.*

1. When and why must product be stored? 2. How does Philips tackle the warehousing issue? 3. What does the manufacturer's/supplier's use of inventory depend on? 4. How is retail network organized in Japan and most European countries? 5. How is storage issue solved by retail stores in the United States? 6. How does an international company solve the warehousing issue in a foreign market? 7. What kind of services do public warehouses in the US provide? 8. How can maximum logistics efficiency be achieved? 9. How can you define productivity, utilization and warehouse performance? 10. Why do logistics executives seek to improve warehouse productivity? 11. In what ways can it be improved? 12. Why are financial accounting and control techniques important in assessing the risks of warehousing decisions? 13. What techniques help to financially control warehousing activities? 14. What is the essence of ABC technique? 15. What are the levels of warehousing accounting and control?

Ex. 4. *Expand on the following statements from the text.*

1. Products may be stored at different points within the distribution channel. 2. Each component of the logistics system must operate at optimal levels. 3. Warehousing is a significant component of the logistics process in terms of costs and service inputs. 4. Warehousing financial control is closely linked to logistics productivity and corporate profitability.

Ex. 5. Work in pairs. Describe how warehouse productivity can be measured and improved.

Creative Solutions

Less Warehousing, Better Distribution

Lincoln Electric is the world's leading manufacturer of welding equipment and supplies, as well as a major producer of electric motors. The company used to have 36 to 40 small warehouses scattered around the country. Pricing policies were designed lo encourage large orders that would simplify manufacturing and shipping to end users and stocking distributors.

Because the firm's local warehouses were not large enough to carry a complete stock to supply the growing needs of the distribution network, the company decided to consolidate its distribution in a much smaller number of larger, well-stocked regional distribution centers.

The first distribution center (DC) was set up in Cleveland, Ohio, toward the end of 1989. New DCs were added lo cover the rest of the country and corresponding local warehouses were closed when they became redundant. Not only did (he consolidation reduce the degree to which inventory was dissipated in multiple locations, but it provided an opportunity to refocus the local facilities.

Lincoln Electric has six regional distribution centers located across the United States and two in Canada. Others are planned for Philadelphia and Mexico, as well as parts of Europe and South America. The U.S. distribution centers range in size from 30,000 to 100.000 square feet and arc operated by staffs that vary from three to about a dozen employees.

To get up and running faster, the operations of some new DCs were contracted out, although each has at least one Lincoln Electric employee at the location.

By working more effectively with its distributors and helping them serve their end users better, Lincoln Electric is able to meet the broader needs of the entire arc welding market more effectively. Independent welding distributors can carry a lower level of inventory and rely on a Lincoln Electric DC to provide most items their customers need, usually in 24 to 72 hours.

With minimal delay, customers receive more of the products they need to keep operating. Distributors can provide better customer service and turn inventories more often while maintaining smaller stocks and relying on the distribution centers for backup.

By improving the way it serves customers, Lincoln Electric gains greater efficiency, increased sales, and positive customer relations.

Technology

Radio to the Rescue

"Software can be a real space saver in the warehouse today. Especially when it's combined with a radio-frequency (RF) system to track product instantly. At least that's what West Coast grocery chain Smart and Final discovered.

Faced with a space shortage, the company installed a radio-frequency inventory management system to provide a 'real time' fix on its inventory. Thanks to that up-to-the-minute information about stock on hand, the company was able to use warehouse space better. ... How much better? Smart and Final estimates that the radio-frequency inventory management system brought about a 10 to 15 per cent increase in space utilization.

The West's oldest and largest grocery retailer, Smart and Final earned roughly $1. billion last year [1995]. The Los Angeles-based company, which operates a chain of approximately 150 non-membership warehouse stores up and down the West Coast, ships more than 400 outbound loads of dry goods and health and beauty care products weekly from its distribution center in Los Angeles. A private fleet delivers product to the stores and picks up some inbound shipments on backhauls as well. The company moves freight seven days a week, shipping full trailerloads whenever possible.

Due to growing business, however, the company faced a space shortage at its distribution center three years ago. It had begun considering relocating to a new warehouse when managers decided that a real-time inventory software system just might do the trick. [The company] purchased a radio-frequency (RF) control system that would enhance the company's existing computer system. In an RF setup, workers scan bar-coded items. The scanned data then are fed continuously via radio waves to a computer that monitors stock level and location.

As impressive as the inventory-related improvements may be, they're not the whole story. For one thing, the radio-frequency inventory system also has increased productivity by 25 percent. Today, the center completely turns its inventory 26 times a year.

But most importantly of all, the system increased space utilization at Smart and Final's distribution center to such a degree that a new warehouse is no longer needed."

BBN Communications Serves Customers Worldwide

BBN Communications of Cambridge, Massachusetts, manufactures high-value telecommunications and networking equipment, "including components that allow a firm's satellite offices to combine all computer traffic on a local area network and communicate with the home office to share information." The firm searched for ways to improve service levels to customers located in North America and Europe.

"BBN Communications' remote warehousing solution relies on same-day shipping and delivery of ... components. BBN has established sites in London and Stuttgart for warehousing its high-value materials. London currently is the larger of the two sites.

"Not only do these sites build a comfort level for the parts managers, but also they make life easier on the BBN sales staff ... There are hidden dollar savings to using a location within the [EU] for warehousing parts. One never knows to which country a part might be sent and it is impractical to establish warehouses in every country. By establishing parts centers within the [EU], BBN pays duties only once on materials shipped into [another country] and stored at a parts bank.

"So successful has the European parts bank been [that the company] is considering establishment of a similar depot in Asia ... either Singapore or Hong Kong — to take advantage of the duty free ports there, again bringing cost savings into the warehousing and distribution network."

Target Stores Discover There is More to Site Selection Than Running the Right Models

In choosing a location for a major distribution center to serve the Chicago region, Target Stores considered 55 sites in three states. It did all of the right things: considered proximity to market, transportation costs, labor availability, and tax incentives offered by each community. It narrowed the pool of prospects to three sites, then chose an industrial park in Oconomowoc, Wisconsin. What Target didn't anticipate was landing in the middle of a battle between politicians over environmental concerns.

Target had gone through all the necessary legal and environmental processes to break ground on the Wisconsin site. Yet the environmental groups weren't satisfied. What about groundwater runoff? What about air pollution and congestion from truck and employee traffic? These groups believed the Target project was rushed — "ramrodded" through the state with minimal public awareness or input. To complicate matters further, a neighboring town was protesting this development because of an old battle with Oconomowoc on water and sewer lines. Wisconsin politicians were upset about the impact that this battle would have on the state's "aggressive pro-business attitude."

What did Target learn from this process? Target management would have taken more time to meet in advance with local groups if they had realized the extent of these concerns. Second, going through all the 'right' steps in the political process — dealing with regulators and local governments — is not enough. Third, citizens in small towns such as Oconomowoc, population 7,000, are even more sensitive to the impact of a new facility in their town. Adding more housing, schools, roads, and general infrastructure might change the atmosphere of the town in a manner that would be viewed unfavorably by current residents. Local businesses might feel threatened that their longtime employees may be stolen away by the new employer in town.

Once a facility is in place, its long-range success and viability depends on maintaining and enhancing its good citizenship. Target is committed to this policy. As part of this commitment, it donates 5 percent of its pretax income each year to communities where it has facilities. This story has a happy ending. The Oconomowoc facilities were built and are operational. A great deal of expense and delay could have been avoided by involving the community and concerned citizens and groups in the process at an earlier stage.

How Moore Keeps Its Operations in Top Form

A Canadian corporation headquartered in Toronto, Moore Business Forms and Systems manufactures custom business forms and documents. Corporate sales in 1994 topped $2.3 billion.

To serve customers in the United States, Moore operates 18 U.S. distribution centers. Although some 75 percent of products are shipped directly from the factory to the purchaser, another 25 percent go into storage for later shipment.

Moore developed six critical measurements designed to maximize warehouse efficiency and effectiveness while maintaining a high level of customer service. The six-element program (referred to as the RSVP program) consists of the following:

1. Safely — zero safety incidents or accidents; the OSHA employee logbooks that report accidents are used for evaluation.
2. Shipping Errors — zero shipping errors in the firm's pick and pack activities (i.e., ship exactly what was ordered to the customer); financial statement information indicates whether orders have been filled completely.
3. On-Time Shipments — delivery of freight precisely when requested because customers are operating JIT operations; warehouse records on shipping performance are used for evaluation.
4. Customer Problems — customer feedback is periodically requested for every shipment, and summary statistics are compiled for management review.
5. Cost per Line Shipped — based on the number of items shipped in a period, the company came up with a cost per line and measures that expense against a pre-established objective; financial statements and the firm's computerized inventory system measure costs in this area.
6. Total Warehouse Expenses — an overall measure of warehouse efficiency which determines whether workers kept warehousing costs in line with company standards and projections.

At the end of each quarter, Moore measures each ware-house's performance against the criteria and issues bonuses to the employees, managers, and directors. During 1994, more than a third of the warehouses met all six objectives. At the end of the year, 99.6 percent of Moore's customers rated their service level as good or better.

Warehousing in the High-Fashion Goods Industry

Fashion is a very perishable commodity ... a hot-selling fashion item is a loser ... unless it is on the selling floor precisely when it is most in fashion. In some cases, that can be as little as 7 to 10 days.

Saks Fifth Avenue operates 69 stores served by two distribution centers. One is in Yonkers, New York, close to Saks's flagship store on New York City's Fifth Avenue. The second is in Ontario, California, well situated to serve the trendy Southern California market.

Neither of these operations is in any sense a warehouse ... Items generally move through these centers on a 24-hour turnaround. There is an emphatic realization ... that every hour that a rack of $800 dresses sits in a distribution center can represent a lost sale and lost profit.

Speedy transit starts at the beginning of the pipeline. About 80 percent of Saks's imported items move into one of these centers by air freight. Imports move to one of the distribution centers based on the region where they originate: Yonkers handles the European imports and Ontario covers the Far East.

Items are exchanged between the two centers by air freight, with a dedicated flight in each direction between New York and Los Angeles every business day.

The distribution centers then serve their local stores with a combination of air freight and trucking.

Clues to Worked Examples

Worked example 1

Solution

Taking costs over a year, the current position is:

Cost of stock	= amount of stock x holding cost	
	= 10 mln x 0.25 x 0.2	= £ 0.5 mln a year
Total costs	= operating costs + cost of stock	
	= 7.5 mln + 0.5 mln	= £ 8 mln a year
Profit	= sales – total costs	
	= 10 mln – 8 mln	= £ 2 mln a year
Total assets	= total assets + stock	
	= 20 mln + (10 mln x 0.25)	= £ 22.5 mln
Return on assets	= profit / total assets	
	= 2 mln / 22.5 mln	= 0.089 or 8.9%

The new position with stock reduced to 20% of sales has:

Cost of stocks	= 10 mln x 0.2 x 0.2	= £ 0.4 mln a year
Total costs	= 7.5 mln + 0.4 mln	= £ 7.9 mln a year
Profit	= 10 mln – 7.9 mln	= £ 2.1 mln a year
Total assets	= £ 20 mln + (£ 10 mln x 0.20)	= £ 22 mln
Return on assets	= 2.1 mln / 22 mln	= 0.095 or 9.5%

Reducing stocks gives lower operating costs, higher profit and a significant increase in ROA.

Worked example 2

Solution

Gross profit is 5% of sales, so if we take sales of $100, operating costs amount to $95. At present, 22% of this, or 95 x 0.22 = $20.90, is due to logistics.

If the company reduces the cost of logistics by 10%, it would save 20.90 x 0.1 = $2.09. Assuming that there are no changes to the selling price or other costs, this is a direct contribution to profit. A 10% reduction in logistics costs raises profit from $5 to $7.09, or an increase of 42%.

Without the reduction in logistics costs, the company would have to increase sales by 42% to get the same increase in profit.

Worked example 3

Solution

The spreadsheet shows this for the first week when demand of 100 units moves through the supply chain. For each tier, you can see:

- demand - which equals the amount bought by the next tier of customers
- opening stock at the beginning of the week - which equals its closing stock in the previous week
- closing stock at the end of the week - which must equal demand in the week
- number of units bought - which equals demand plus any change in stock:

buys = demand met + (closing stock - opening stock)

In week 1 everything is going smoothly, with the usual 100 units flowing down the supply chain. Then in week 2 customer demand goes up to 105 units. The retailer must buy 105 units to meet this demand, plus an additional 5 units to raise its closing stock to 105. So it buys 110 units from the local wholesaler. The local wholesaler has to supply this 110 units, plus an additional 10 units to raise its closing stock to 110 units. So it buys 120 units from the regional wholesaler. The regional wholesaler has to supply this 120 units, plus another 20 units to raise its closing stock to 120 units. So it buys 140 units from the manufacturer.

In week 3 we get the reverse effect as customer demand returns to 100 units. The retailer now reduces closing stock to 100 units, so it only has to buy 95 units from the local wholesaler. The local wholesaler reduces its closing stock by 15, so it only has to buy 80 from the regional wholesaler. The regional wholesaler reduces its closing stock by 40, so it only buys 40 from the manufacturer. The manufacturer would like to reduce its closing stock by 100 units, but its demand is only 40 units so it stops production and meets all demand from stock.

A variation in customer demand of five units in one week has made manufacturing vary by 180 units a week, with an effect continuing for several more weeks.

A List of Abbreviations

ABC – activity based costing

AOL – an American multinational mass media corporation based in New York City

AS – automated storage

BAT – the **Bloomberg Aptitude Test** – is an aptitude test owned, published, and developed by Bloomberg Institute – an educational division of Bloomberg LP. It is used by employers in the business world to evaluate employment candidates. (Bloomberg L.P. is a privately held financial software, data and media company headquartered in New York City).

BBN Communications (formerly Bolt, Beranek and Newman) – a technology company in Cambridge, Massachusetts.

B2B – **business-to-business** – is commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer.

B2C – **business-to-consumer** – is a transaction that occurs between a company and a consumer, as opposed to a transaction between companies. The term may also describe a company that provides goods or services for consumers.

CL – carload

CTL – a British computer manufacturer of the 1970s and 1980s.

DC – distribution centre

DEL – **Dell Inc.** – is an American privately owned multinational computer technology company based in Round Rock, Texas, United States, that develops, sells, repairs and supports computers and related products and services. Bearing the name of its founder, Michael Dell, the company is one of the largest technological corporations in the world, employing more than 103,300 people worldwide

DHL – a division of the German logistics company **Deutsche Post DHL** providing international express mail services

DVD – (**digital versatile disc** or **digital video disc**) is a digital optical disc storage format, invented and developed by Philips, Sony, Toshiba, and Panasonic in 1995.

EDI – electronic data interchange

EFT – electronic fund transfer

EPOS – electronic point-of-sales data

EU – the **European Union** – is a politico-economic union of 28 member states that are located in Europe.

Exel – a spreadsheet application by Microsoft Corporation.

FedEx – **FedEx Corporation** – is an American global courier delivery services company headquartered in Memphis, Tennessee. The name "FedEx" is a syllabic abbreviation of the name of the company's original air division, Federal Express, which was used from 1973 until 2000.

GATX – an equipment finance company based in Chicago, Illinois. Founded in 1898, GATX's primary activities consist of railcar operating leasing in North America and Europe. In addition, GATX leases locomotives in North America, and also has significant investments in industrial equipment and marine assets, including ownership of the American Steamship Company, which operates on the Great Lakes.

GDP – **Gross Domestic Product** – is defined by the Organization for Economic Co-operation and Development as "an aggregate measure of production equal to the sum of the gross values added of all resident, institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs)

GKN – **GKN plc** – is a British multinational automotive and aerospace components company headquartered in Redditch, Worcestershire.

HGV – **heavy goods vehicle** – a truck category

IBS – IBS Software Services is an Indian multinational IT solutions provider to the Travel Transportation and Logistics (TTL) industry. The company is headquartered at Technopark, Trivandrum India.

IRS – **The Internal Revenue Service** – the revenue service of the United States federal government. The government agency is a bureau of the Department of the Treasury, and is under the immediate direction of the Commissioner of Internal Revenue. The IRS is responsible for collecting taxes and the administration of the Internal Revenue Code. It has also overseen various benefit programs, and enforces portions of the Affordable Care Act.

ISO 9002 – model for quality assurance in production, installation and servicing

JIT – **just in time** – is a methodology aimed primarily at reducing flow times within production as well as response times from suppliers and to customers.

PC – **personal computer** – is a general-purpose computer whose size, capabilities and original sale price make it useful for individuals, and is intended to be operated directly by an end-user with no intervening computer operator

PRISM Team Services – is a clandestine surveillance program under which the United States National Security Agency (NSA) collects internet communications from at least nine major US internet companies.

RF – radio frequency

ROA – **return on assets** – shows the percentage of how profitable a company's assets are in generating revenue.

Ryder Integrated Logistics – a popular truck rental and leasing company for companies' distribution and supply chain efforts.

RSs – retrieval systems

RSVP – request for response (French: *répondez s'il vous plaît*)

TL – truckload

UK – the United Kingdom of Great Britain and Northern Ireland, commonly known as the **United Kingdom** or Britain, is a sovereign state in Europe.

UPS – **United Parcel Service, Inc.** – is the world's largest package delivery company and a provider of supply chain management solutions

US – the United States of America, commonly referred to as the **United States** or America, is a federal republic consisting of 50 states and a federal district.

PART II.

Texts For Individual Reading

Text 1. Introduction to logistics and distribution

The key components of distribution have been an important feature of industrial and economic life for countless years, but it is only in the relatively recent past that distribution has been recognized as a major function in its own right. The main reason for this has probably been the nature of distribution itself. It is a function made up of many sub-functions and many sub-systems, each of which has been, and may still be, treated as a distinct management operation. Both the academic and the business world now accept that there is a need to adopt a more holistic view of these different operations in order to take into account how they interrelate and interact with one another. The appreciation of the scope and importance of distribution and logistics has led to a more scientific approach being adopted towards the subject. This approach has been aimed at the overall concept of the logistics function as a whole and also at the individual sub-systems. Much of this approach has addressed the need for, and means of, planning distribution and logistics, but has also considered some of the major operational issues.

Scope and definition. Parallel to the growth in the importance of distribution and logistics has been the growth in the number of associated names and different definitions that are used. Some of the different names that have been applied to distribution and logistics include: • physical distribution; • logistics; • business logistics; • materials management; • procurement and supply; • product flow; • marketing logistics; • supply chain management; • demand chain management; and there are several more.

There is, realistically, no 'true' name or 'true' definition that should be pedantically applied, because products differ, companies differ and systems differ. Logistics is a diverse and dynamic function that has to be flexible and has to change according to the various constraints and demands imposed upon it and with respect to the environment in which it works. So these many terms are used, often interchangeably, in literature and in the business world. One quite widely accepted view shows the relationship as follows:

Logistics = Supply + Materials management + Distribution

As well as this, logistics is concerned with *physical* and *information* flows and storage from raw material through to the final distribution of the finished product. Thus, supply and materials management represents the storage and flows into and through the production process, while distribution represents the storage and flows from the final production point through to the customer or end user. Major emphasis is now placed on the importance of information as well as physical flows and storage,

and an additional and very relevant factor is that of reverse logistics - the flow of used products and returnable packaging back through the system.

Concepts of Logistics and Distribution.

Logistics is... the management of all activities which facilitate movement and the co-ordination of supply and demand in the creation of time and place utility. (Hesket, Glaskowsky and Ivie, 1973)

Logistics is the art and science of managing and controlling the flow of goods, energy, information and other resources. (Wikipedia, 2006)

Logistics management is... the planning, implementation and control of the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer requirements. (CSCMP, 2006)

Logistics is... the positioning of resource at the right time, in the right place, at the right cost, at the right quality. (Chartered Institute of Logistics and Transport (UK), 2005)

It is interesting to detect the different biases – military, economic, academic, etc. An appropriate modern definition that applies to most industry might be that logistics concerns *the efficient transfer of goods from the source of supply through the place of manufacture to the point of consumption in a cost-effective way whilst providing an acceptable service to the customer.*

For most organizations it is possible to draw up a familiar list of key areas representing the major components of distribution and logistics. These will include transport, warehousing, inventory, packaging and information. This list can be 'exploded' once again to reveal the detailed aspects within the different components.

All of these functions and sub-functions need to be planned in a systematic way, in terms both of their own local environment and of the wider scope of the distribution system as a whole. A number of questions need to be asked and decisions made. The different ways of answering these questions and making these decisions will be addressed in the chapters of this book as consideration is given to the planning and operation of the distribution and logistics function. In addition, the total system interrelationships and the constraints of appropriate costs and service levels will be discussed.

Historical perspective. The elements of distribution and logistics have, of course, always been fundamental to the manufacturing, storage and movement of goods and products. It is only relatively recently, however, that distribution and logistics have come to be recognized as vital functions within the business and economic environment. The role of logistics has changed in that it now plays a major part in the success of many different operations and organizations. In essence, the underlying concepts and rationale for logistics are not new. They have evolved through several stages of development, but still use the basic ideas such as trade-off analysis, value chains and systems theory together with their associated techniques.

There have been several distinct stages in the development of distribution and logistics.

1950s and early 1960s. In this period, distribution systems were unplanned and unformulated. Manufacturers manufactured, retailers retailed, and in some way or other the goods reached the shops. Distribution was broadly represented by the

haulage industry and manufacturers' own-account fleets. There was little positive control and no real liaison between the various distribution-related functions.

1960s and early 1970s. In the 1960s and 1970s the concept of *physical distribution* was developed with the gradual realization that the 'dark continent' was indeed a valid area for managerial involvement. This consisted of the recognition that there was a series of interrelated physical activities such as transport, storage, materials handling and packaging that could be linked together and managed more effectively. In particular, there was recognition of a relationship between the various functions, which enabled a systems approach and total cost perspective to be used. Under the auspices of a physical distribution manager, a number of distribution trade-offs could be planned and managed to provide both improved service and reduced cost. Initially the benefits were recognized by manufacturers who developed distribution operations to reflect the flow of their product through the supply chain.

1970s. This was an important decade in the development of the distribution concept. One major change was the recognition by some companies of the need to include distribution in the functional management structure of an organization. The decade also saw a change in the structure and control of the distribution chain. There was a decline in the power of the manufacturers and suppliers, and a marked increase in that of the major retailers. The larger retail chains developed their own distribution structures, based initially on the concept of regional or local distribution depots to supply their stores.

1980s. Fairly rapid cost increases and the clearer definition of the true costs of distribution contributed to a significant increase in professionalism within distribution. With this professionalism came a move towards longer-term planning and attempts to identify and pursue cost-saving measures. These measures included centralized distribution, severe reductions in stock-holding and the use of the computer to provide improved information and control. The growth of the third-party distribution service industry was also of major significance, with these companies spearheading developments in information and equipment technology. The concept of and need for integrated logistics systems were recognized by forward-looking companies that participated in distribution activities.

Late 1980s and early 1990s. In the late 1980s and early 1990s, and linked very much to advances in information technology, organizations began to broaden their perspectives in terms of the functions that could be integrated. In short, this covered the combining of materials management (the inbound side) with physical distribution (the outbound side). The term 'logistics' was used to describe this concept. Once again this led to additional opportunities to improve customer service and reduce the associated costs. One major emphasis recognized during this period was the importance of the informational aspects as well as the physical aspects of logistics.

1990s. In the 1990s the process was developed even further to encompass not only the key functions within an organization's own boundaries but also those functions outside that also contribute to the provision of a product to a final customer. This is known as *supply chain management.* The supply chain concept thus recognizes that there may be several different organizations involved in getting a product to the marketplace. Thus, for example, manufacturers and retailers should act together in partnership to help create a logistics pipeline that enables an efficient and effective flow of the right products through to the final customer. These partnerships

or alliances should also include other intermediaries within the supply chain, such as third-party contractors.

2 000 and beyond. Business organizations face many challenges as they endeavour to maintain or improve their position against their competitors, bring new products to market and increase the profitability of their operations. This has led to the development of many new ideas for improvement, specifically recognized in the redefinition of business goals and the re-engineering of entire systems.

One business area where this has been of particular significance is that of logistics. Indeed, for many organizations, changes in logistics have provided the catalyst for major enhancements to their business. Leading organizations have recognized that there is a positive 'value added' role that logistics can offer, rather than the traditional view that the various functions within logistics are merely a cost burden that must be minimized regardless of any other implications. Thus, the role and importance of logistics have, once again, been recognized as a key enabler for business improvement.

Importance of logistics and distribution. It is useful, at this point, to consider logistics in the context of business and the economy as a whole. Logistics is an important activity making extensive use of the human and material resources that affect a national economy. Several investigations have been undertaken to try to estimate the extent of the impact of logistics on the economy. One such study indicated that about 30 per cent of the working population in the UK are associated with work that is related to logistics. A recent study undertaken in the USA indicated that logistics alone represented between 10 and 15 per cent of the gross domestic product of most major North American, European and Asia/ Pacific economies. These numbers represent some very substantial costs, and serve to illustrate how important it is to understand the nature of logistics costs and to identify means of keeping these costs to a minimum. The two lowest-cost countries are the UK and the United States, probably because there has been a greater recognition of the importance of logistics in these two particular countries for many years now. The average for all countries is only about 2.5 percentage points higher: relatively low, because in recent years the importance of logistics has been recognized in many more countries. About 20 years ago, if the same statistics had been available, these percentage elements would undoubtedly have been a lot higher in all of these countries. In the UK, records go back for 20 years, and logistics costs were then around the 18 to 20 per cent mark. The breakdown of the costs of the different elements within logistics has also been included in a number of surveys. A survey of US logistics costs undertaken by Herbert W. Davis & Company (2005) indicated that transport was the most important element at 45 per cent, followed by inventory carrying cost (23 per cent), storage/warehousing (22 per cent) and administration (10 per cent). These broad figures are supported by a European logistics productivity survey, produced by A.T. Kearney. These results, covering the major EU economies, placed Logistics costs as a percentage of GDP for selected countries transport at 41 per cent, inventory carrying cost at 23 per cent, warehousing at 21 per cent and administration at 15 per cent of overall costs. In both studies, therefore, the transport cost element of distribution was the major constituent part.

It is interesting to see how the relative make-up of these costs varies from one company to another and, particularly, from one industry to another. There are some

quite major differences amongst the results from the various companies. One of the main reasons for these cost differences is that logistics structures can and do differ quite dramatically between one company and another, and one industry and another. Channels can be short (i.e. very direct) or long (ie have many intermediate stocking points). Also, channels may be operated by manufacturers, retailers or, as is now becoming increasingly common, specialist third-party distribution companies. The relative importance of logistics is, of course, measured in relationship to the overall value of the particular products in question. Cement is a low-cost product (as well as being a very bulky one!), so the relative costs of its logistics are very high. Spirits (whisky, gin, etc) are very high-value products, so the relative logistics costs appear very low. These and other associated aspects are discussed in subsequent chapters.

Logistics and distribution structure. The discussion in the previous sections of this chapter has illustrated the major components to be found within a logistics or distribution system. The fundamental characteristics of a physical distribution structure could be considered as the flow of material or product, interspersed at various points by periods when the material or product is stationary. This flow is usually some form of transportation of the product. The stationary periods are usually for storage or to allow some change to the product to take place – manufacture, assembly, packing, break-bulk, etc.

There is also, of course, a cost incurred to enable the distribution operation to take place. The importance of this distribution or logistical cost to the final cost of the product has already been highlighted. As has been noted, it can vary according to the sophistication of the distribution system used and the intrinsic value of the product itself. One idea that has been put forward in recent years is that these different elements of logistics are providing an 'added value' to a product as it is made available to the final user – rather than just imposing an additional cost. This is a more positive view of logistics and is a useful way of assessing the real contribution and importance of logistics and distribution services.

Text 2. Customer service and logistics

The importance of customer service. There are few companies that do not recognize the importance of the provision of good customer service. But, why is it so important? There are many different answers to this question, ranging from the growth in competition to the raising of customers' expectations to the similarity of the basic products that are offered. One way of considering customer service is to differentiate between the core product itself and the service elements related to the product.

The core product concerns the item itself: the technical content, the product features, the ease of use, the style and the quality. The service elements, which can be called the 'product surround', represent the availability of the product, the ease of ordering, the speed of delivery, and after-sales support. There is a long list (as we shall see later in this chapter), and clearly not all of the service items on our list are relevant to all products. It is recognized by the marketing departments of many companies that the product surround elements are very important in determining the final demand for a product. In addition, these aspects often represent only a small

percentage of the cost of a product. Thus, true to the Pareto 80/20 rule, it is estimated that product surround or logistics elements represent about 80 per cent of the impact of the product but only represent 20 per cent of the cost. Thus, no matter how attractive the product may be, it is essential that the customer service elements are satisfactory and, as we shall see, logistics plays a crucial role in providing good customer service.

One of the definitions of logistics that was provided in the first chapter referred to 'the positioning of resource at the right time, in the right place, at the right cost, at the right quality'. This definition can be expanded into what might be considered as the seven 'rights' of customer service. These are the right quantity, cost, product, customer, time, place and condition. All of these different aspects can be key requisites of a good customer service offering – indeed, each of them may be essential to ensure that a product achieves its expected sales in the various markets where it is made available. It is notable that all of these elements are affected by the standard and quality of the logistics operations that are an integral part of getting a product to market. Thus, these elements can provide the basis for identifying the different aspects of logistics that should form a part of any customer service offering, and also, and this is of equal importance, these elements should become the basis of the key measurements that are used to monitor operational success or failure. This will be considered in the final sections of this chapter.

The components of customer service. The logistics components of customer service can be classified in different ways. They may be seen as transaction-related elements, where the emphasis is on the specific service provided, such as on-time delivery, or they may be seen as functional attributes that are related to overall aspects of order fulfilment, such as the ease of order taking.

Transaction elements are usually divided into three categories. These reflect the nature and timing of the particular service requirements (before, during and after delivery of the product):

1. Pre-transaction elements: these are customer service factors that arise prior to the actual transaction taking place. They include: written customer service policy; accessibility of order personnel; single order contact point; – organizational structure; method of ordering; order size constraints; system flexibility; transaction elements.

2. Transaction elements: these are the elements directly related to the physical transaction and are those that are most commonly concerned with distribution and logistics. Under this heading would be included: order cycle time; order preparation; – inventory availability; – delivery alternatives; – delivery time; – delivery reliability; - delivery of complete order; – condition of goods; – order status information.

3. Post-transaction elements: these involve those elements that occur after the delivery has taken place, such as: availability of spares; call-out time; – invoicing procedures; – invoicing accuracy; product tracing/warranty; returns policy; – customer complaints and procedures; claims procedures.

Customer service elements can also be classified by *multifunctional dimensions.* The intention is to assess the different components of customer service across the whole range of company functions, to try to enable a seamless service provision. Time, for example, constitutes a single requirement that covers the entire span from order placement to the actual delivery of the order – the order cycle time. One of the main consequences of this approach is that it enables some very relevant

overall logistics measures to be derived. These will be considered later in this chapter. The four main multifunctional dimensions are:

1. time – usually order fulfilment cycle time;

2. dependability – guaranteed fixed delivery times of accurate, undamaged orders;

3. communications – ease of order taking, and queries response;

4. flexibility – the ability to recognize and respond to a customer's changing needs.

Each of these can be broken down into further detailed elements. The total order fulfilment cycle time has been split into the five main time-related components from order receipt to final delivery, plus a preliminary step from order placement to order receipt, which is not considered by some companies because it is deemed to be part of the customer's ordering process. When identifying and measuring order fulfilment cycle time it is important to be able to break it down to all of the key components. Thus, if there is a customer detailed problem can be identified and remedied. As indicated here, there are many different elements of customer service, and their relevance and relative importance will vary according to the product, company and market concerned.

Two conceptual models of service quality. Service quality is a measure of the extent to which the customer is experiencing the level of service that he or she is expecting. Thus, a very simple, yet effective, view of service quality is that it is the match between what the customer expects and what the customer experiences. Any mismatch from this can be called the 'service quality gap'. Note that the customer viewpoint is what the customer perceives or believes to be happening, not necessarily what is *actually* happening in terms of what the supplier is providing (or thinks he or she is providing). Perceived quality is always a judgement that the customer makes — whatever the customer thinks is reality is reality, no matter what the supplier may believe to the contrary! This is another reason why careful measurement of customer service is necessary: to be able to demonstrate that certain agreed standards are being achieved. Thus, service quality is what the customer thinks that it is:

Service quality = perceived performance x 100 desired expectations

A rather more complicated approach can also be used as a conceptual model of service quality. The aim of this approach is to identify the various different service gaps that can or might appear throughout the customer service process. Measures are then set up to assess the relative importance of each of these gaps and to monitor them on a regular basis. The starting point is the supplier's perception of what he or she thinks is the customer's service expectation. From this, the supplier should develop appropriate service quality standards and specifications. These should then be communicated to and agreed with the customer. Subsequently, the service is provided by the supplier via the logistics operation. The customer will then have a certain expectation of the service level to be provided and can compare this to the service that he or she perceives is being received. This concept is developed to illustrate the potential areas for service failure. Working backwards, the main issue is likely to be the one between the service that the customer expects and the service that the customer perceives to be provided. This is the perceived service – expected service gap, and for both the customer and the supplier it is the major aspect of

service quality that needs to be measured. How is this undertaken? As described later in this chapter, there are a number of different types of customer service studies that can be carried out to achieve this. However, it is also important to be able to identify *why any* such service failure has occurred, and the different reasons can be identified by measuring the other service gaps. These are as follows:

•*Gap 5: actual service – perceived service gap:* this is the difference between the service that the supplier is providing and the service that the customer thinks is being received. This gap may, typically, be caused because the supplier and the customer are measuring service in a different way.

• *Gap 4: service delivery – external communication gap:* this is the difference between the actual service that is provided and the promised level of service that was communicated to the customer. This gap may be caused by a misunderstanding in communication.

• *Gap 3: service standard – service delivery gap:* this is the difference between the actual service that is provided and the planned level of service based on the service specification that has been set. The cause for this gap may be inefficiency within the delivery service.

• *Gap 2: management perception — service standard gap:* this is the difference between the service specification that is set and the supplier management assessment of customer service requirements. This gap is likely to be caused by an inadequate initial operational set-up.

• *Gap 1: customer expectation–management perception gap:* this is the difference between the service that the customer expects and the service level that the supplier thinks that the company wants. This gap is usually caused because the supplier does not understand the real customer requirements. Conceptual models of this nature are valuable to help the understanding of the underlying issues that are involved. They need to be interpreted into a practical format to enable actual service policies to be derived. The remaining sections of this chapter address this requirement.

Developing a customer service policy. An appropriate customer service policy needs to be developed based on identifiable customer service requirements, and a suitable logistics operation must be established to provide this service. The next few sections of this chapter describe how this can be done. Because there are so many different elements of customer service, this policy must be very clearly and carefully defined. Also, there are many different types of customer even for the same product. A can of cola, for example, may be bought in a supermarket, a corner shop or a petrol station, or from a self-service dispensing unit. It is unlikely that a manufacturer of cola would wish to provide exactly the same level and style of service to all these very different customer types. This is why many companies segment their customers into different customer categories. It is also an additional reason for having a distinct customer service policy. Many studies have been undertaken to measure the effects of poor customer service. These studies conclude, quite categorically, that, where stock is not available or where delivery is unreliable, many buyers will readily turn to an alternative supplier's products to fulfil their requirements. It is also important to understand what minimum requirements are necessary when identifying any particular service policy. A supplier is really working towards meeting customers' minimum requirements to cross the threshold of customer satisfaction. If these

minimum requirements are not met, the supplier cannot even expect to be considered as a feasible supplier. Once these requirements are met and the supplier begins to exceed them, it then becomes possible to achieve customer satisfaction and begin to add value to the supply relationship. Once the positive need for a customer service policy has been accepted, it is useful to adopt a recognized approach to determine the basic requirements and format of this policy. As well as showing the major steps that should be taken, the figure also indicates how these steps can be carried out. This is a six-step plan to identify key customer service components and then to design and maintain a suitable customer service package.

The main steps are:

1. Identify the main elements of service and identify suitable market segments. The first step is to identify those elements of service that are most highly rated by customers. Only then can the company's resources be concentrated on these key factors. The main means of determining these key elements are by market research techniques. These processes might include: the identification of the main decision maker or buyer of the product; the use of personal interviews to determine the importance of customer service and the different elements within customer service; the use of group interviews to determine the same. The importance of this stage is to identify relevant measures of service that are generated by customers themselves and not imposed arbitrarily by 'best guesses' from outside. A major output from this stage of the study is to enable an appropriate survey questionnaire to be designed. In addition, it is important at this stage to identify the different market segments or customer types that exist. It is highly unlikely that a universal level of customer service will be appropriate for all customers. Most customer populations consist of a range of customers of different size and importance. Part of this preliminary stage is, therefore, to try to identify broad customer categories and to ensure that any questionnaire is designed to enable the different requirements of these different categories to be identified. It should be noted that there is a variety of types of customer service study that can be used. For some companies it is relevant to use several of these for different purposes.

The most common approach for the major element of a study is likely to be a detailed questionnaire-based customer survey. This can be undertaken in a number of different ways including telephone, mail/post, face to face or web-based. Survey or questionnaire design is a vital part of the overall process, and when putting together a questionnaire it is sensible to refer to one of the many books that have been written that address the topic specifically. The major steps can be summarized as follows: - Clarify the purpose and objectives. - Identify any specific information required. - Select the most appropriate survey type. Determine the resources required to undertake the survey. Determine who should undertake the survey. Determine who should complete the survey. - Identify key customer/market segments. Identify key service elements to include. Prepare the question and answer format. Design the analysis and reporting format. - Determine the sample size and selection. Pilot the survey. Adjust and finalize.

2. Determine the relative significance of each service element. Recognized research techniques can be used within the questionnaire to enable measurement of the relative importance of the different service components identified. For a fairly small list of components, some form of order ranking ('most' to 'least' important) or

rating scale (1 to 6 according to importance) can be used. A further technique is that of trade-off analysis. This provides a more sophisticated format for considering and measuring the *relative* importance of different combinations of service components, rather than just scoring them on an individual basis. Straightforward rating of the key elements is often sufficient. It is also possible at this stage to identify what the minimum requirements are for customer service – that threshold below which it is unlikely that a customer will consider a company as a feasible supplier.

3. Establish company competitiveness at current service levels offered. Having identified the key service components and their relative importance to the customer, the next step is to measure how well the company is performing for each of these key components. This can also be achieved using the questionnaire. The list of key components can be rated by the respondent on perceived performance. This will provide an indication of where the company is both underperforming and over-performing and where it has got it about right. It will highlight those areas where there is room for improvement and those areas where too much effort is being spent. There is little benefit in performing extremely well in those areas that are of little consequence to the customer. It is also important to be aware of the company's own position compared to that of its major competitors. Respondents can be asked to rate each competing company in a similar way as a part of the questionnaire. The results will indicate how each competitor performs according to the key service components. The company's performance can then be compared to the competition's and also to the most important service elements as identified in the previous stage of the study. This will provide some very useful information on how well the company is performing compared to its competitors, but more importantly this can be related directly to the customers' key customer service requirements.

The determination of the detailed service requirements can be undertaken by what is known as 'gap analysis'. This is achieved by using the survey results to identify the major performance gaps for each market segment or customer group that is being considered. The key customer service elements should be ranked in order of importance to the customer (to identify the essential ones) and degree of change required (to identify the easy ones or 'quick wins'). Brainstorming and/or some form of process analysis can then be used to identify appropriate remedies or solutions for improving these key elements of service. These are then assessed and ranked according to factors such as cost of change, ease of change, etc.

5. Develop specific customer service packages. This is the implementation phase and it will depend on the results obtained from the stages that have been described. Alternative packages for the different market segments need to be costed accordingly and the most suitable packages determined.

6. Determine monitoring and control procedures. It is vital to ensure that any service policy implemented is also monitored. This requires an effective focus on the measurement of the service provided, involving a systematic and continuous concentration on monitoring and control. In practice, it is rare for this to be adequately carried out: firstly, because companies do not have a recognized customer service policy and, secondly, because companies find it difficult to construct quantifiable standards that are capable of measurement. The first task, then, is to identify the factors that need to be measured. These should be Order picking accuracy based on the major elements identified in the customer service packages that are

developed. The second task is to produce a measure or series of measures. This can be undertaken in different ways for different elements, but must be fair and appropriate for the task in hand. The development of such measures, together with relevant examples, is described later in this chapter. One final point concerns the need to ensure that any service measures are periodically reviewed. Businesses change fairly rapidly, with new products and new customers appearing continually. A regular updating of service measures is relevant, so that old measures are discarded as they become redundant, and new measures are created as they become necessary. Some large companies carry out regular customer service studies designed to identify such changes in service requirements.

Levels of customer service. It has already been stressed that there is a need to balance the level of customer service with the cost of providing that service. This balance is not easy to define, although it can be described quite easily as the point where the additional revenue for each increment of service is equal to the extra cost of providing that increment. It is seldom possible to devise a policy that is absolutely optimal in terms of the cost/service balance. Some companies adopt a cost minimization approach where specific service objectives are laid down and met at a minimum cost. Others choose a service maximization approach where a distribution budget is fixed, and the 'best' service supplied within this cost constraint. The most appropriate approach to adopt will depend on particular product, business or market situations.

One factor that is clear, however, is the relationship between cost and service. The cost of providing a given service is markedly higher the nearer it reaches the 'perfect service' — that is, the 100 per cent mark. Thus, an increase of 2 per cent in service levels will cost far more between 95 and 97 per cent than between 70 and 72 per cent. It should also be noted that a service increase from, say, 95 to 97 per cent may well have little, if any, noticeable impact on the customer's perception of the service being provided, even though it is a costly improvement.

Measuring customer service. It is probably quite clear from reading this chapter that there are many different measures of customer service that might be used. The most important message is that, whatever measures are used, they must reflect the key service requirements for the customer in question. This is not always as obvious as it might seem. One particular example is that of *order fulfilment.* It is possible to measure this in a number of different ways:

- the number of orders completely satisfied, say 18 out of 20, over a period (90 per cent);
- the number of lines delivered from a single order, say 75 out of the 80 lines requested (94 per cent);
- the number of line items or cases delivered from a single order, say 75 out of the 80 lines requested, but only 1,400 of the 1,800 total line items (78 per cent);
- the value of the order completed, say €750 of the €900 order (83 per cent).

Any or all of these might be used, and there is no right or wrong one. The most appropriate is the one that best suits the operation in question. As will be shown later, it may also be relevant to use a combination of these measures.

There are other measures that can be made. These measures might, for example, be aimed at assessing the timeliness of delivery operations. Many express parcels companies set great store by the speed of their delivery operations, and

calculate in detail the time taken from receipt of order or parcel collection to final delivery. This idea is also used for conventional operations. Thus, order fulfilment can also be measured with respect to the *order cycle time* or the actual lead time from the receipt of the order to its final delivery to the customer. For a typical stock order this will be made up of the following discrete times:

• order receipt to order entry; • order entry to allocation for picking; • allocation to dispatch;

• dispatch to delivery.

Some companies now recognize what is called the *'the perfect order'*. This is a measure that attempts to take into account all of the main attributes that go towards the completion of an order that absolutely satisfies customer requirements. This is sometimes known as 'on time in full' or OTIF. The key components are:

• delivered complete to the quantities ordered; • delivered exactly to the customer's requested date and time; • no delivery problems (damage, shortage, refusal); • accurate and complete delivery documentation.

There are also several variations of 'the perfect order' to include such elements as accurate invoicing, etc. Whatever is included, perfect order fulfilment can be measured as: **perfect order fulfilment = number of perfect orders x 100% divided by total number of orders**

Organizations must therefore set clear, customer-service-driven measures of performance that reflect the real standards they are aiming to achieve. These, typically, ask severe questions of many logistics operations. For realistic measurement, any discrepancies should be assessed cumulatively. Thus, if they include

orders received on time	actual 95%	target 98%
orders received complete	actual 98%	target 99%
orders received damage-free	actual 99%	target 99%
orders filled accurately	actual 97%	target 99%
orders invoiced accurately	actual 94%	target 98%

the actual customer service measure achieved is (95 x 98 x 99 x 97 x 94 =) 84 per cent.

This is not as good as it first looks when considering each measure individually. Clear and simple visual methods of presenting data such as these are also important. Figure 3.14 shows a radar gram of these data such that the actual and target figures can be compared at a glance. Chapter 27 provides some additional comment on the development and presentation of key performance indicators.

THE CUSTOMER SERVICE EXPLOSION. The role of customer service as a critical success factor for most companies has, once again, become very significant. There are, perhaps, many different reasons for this resurgence in importance, but the major change stems from a growing realization that satisfying the customer is the key to achieving competitive success. Companies that fail to appreciate this do so at their peril because they may lose significant market share. Service, nowadays, is the key factor of differentiation in a customer's decision to buy one brand rather than another. In other words, good customer service can provide the distinctive difference between one company's offer and its competitors'. Thus, customer service strategy must play a major role in the determination of company strategy.

One key lesson that also comes through is the important role that logistics plays in providing good customer service. The ability to improve service levels and to maintain this improvement is a challenge that faces many companies. What has led to this change? The major factors are:

• the growth in customer expectations – thus service fulfilment has become a priority for any successful strategy;

• the growing professionalism of buyers – many buyers now recognize the importance of service as well as price in the product offering;

• markets have become increasingly service-sensitive – there is little else to differentiate between products;

• the diminution of brand loyalty, particularly with respect to FMCG, where immediate product availability is the vital factor;

• the development of new ideas such as relationship marketing where fulfilling service expectations is the key and customer retention is a priority.

Text 3. Key issues and challenges for logistics

In recent years there have been very significant developments in the structure, organization and operation of logistics, notably in the interpretation of logistics within the broader supply chain. Major changes have included the increase in customer service expectations, the concept of compressing time within the supply chain, the globalization of industry – in terms of both global brands and global markets – and the integration of organizational structures. In addition, there are a number of other influencing pressures that may impact a company's logistics system. These may be external to logistics, such as deregulation, or may indeed derive from changes within logistics, such as improved handling or information technology. It is possible to view these different influences at various points along the supply chain.

It is worth emphasizing that, aside from external issues and developments in technology, many changes in logistics are largely conceptual in nature whereby certain aspects of logistics and the supply chain are viewed with a new or different approach. Many people, especially logistics practitioners, may feel that some of these concepts and approaches are very much like old ideas wrapped in new clothing. To a certain extent this is true; for example, much of the new process-oriented approach to logistics is an echo of what used to be called 'work study'. The use of flowcharts for analysing workflows in distribution and logistics has always been very common.

What a number of these 'new' concepts and approaches are achieving is to reemphasize certain ideas and to rekindle the fires of enthusiasm for constant review and change. As logistics exists in a very dynamic and ever-changing environment, this is probably not a bad development. Another relevant point is that a number of these concepts are not applicable to many operations and organizations. This is often due to their size or to their market; for example, small nationally-oriented organizations are usually unaffected by globalization or supply chain agility. Nevertheless, for large multinational companies these are very important questions that need to be addressed. The traditional key drivers of logistics have always been cost versus customer service. This has not changed, as a recent survey confirms.

THE EXTERNAL ENVIRONMENT. One key influence that has become increasingly important in recent years has been the development of a number of different economic unions (the EU, ASEAN, NAFTA, etc). Although the reason for the formation of these unions may be political, experience has shown that there have been significant economic changes — most of these beneficial ones.

One of the major consequences is *deregulation* within these internal markets, and this has a particular impact on companies' logistics strategies. Within the European Union, for example, there have been significant advances in, amongst others: • transport deregulation; • the harmonization of legislation across different countries; • the reduction of tariff barriers; • the elimination of cross-border customs requirements; • tax harmonization.

Within logistics, this has led many companies to reassess their entire logistics strategy and move away from a national approach to embrace a new cross-border/international structure. There are many examples of companies that have significantly reduced distribution centre (DC) numbers and associated inventory and storage costs whilst maintaining or improving customer service. Another important development that has had a particular impact in Europe is the rise in importance of 'green' or environmental issues. This has occurred through an increasing public awareness of environmental issues, but also as a result of the activity of pressure groups. The consequences for logistics are important. They include: • the banning of road freight movements at certain times and days of the week; • the attempted promotion of rail over road transport; • the recycling of packaging;
• the 'greening' of products; • the outsourcing of reverse logistics flows; • the design of products to facilitate repair, reuse, recycling and the minimization of packaging.

For most cities throughout the world, one very visible external impact is that of *road congestion.* The fact of severe traffic congestion may well have a very negative effect on some of the new concepts in logistics – in particular the idea of JIT and quick-response systems. Allied to this problem is that most forecasts predict a significant increase in vehicle numbers at a time when, in most countries, there are very limited road-building programmes. Many Western countries try to reduce congestion through a combination of road tolls, truck bans, access restrictions, time restrictions and usage tax – all of which have an impact on logistics costs and performance. There is no generally accepted solution. Companies try to alleviate the problem through strategies such as out-of-hours deliveries, stockless depots and the relocation of DCs closer to delivery points.

The extreme changes and developments in logistics thinking and logistics and information technology have also led to another issue – the impact that this has on the *availability of suitable management and labour.* The need for a strategic view of logistics and the need for an appropriate understanding of the integrated nature of logistics are both important for today's supply-chain-oriented networks. Many managers do not have the relevant experience or knowledge that provides this view. Add to this the rapid changes in technology, and it is understandable why there is such a shortage of suitable logistics management. This problem is also reflected in the quality of labour available to work in the many different logistics and distribution functions.

In the past few years there have been a number of unpredictable and unexpected events such as natural disasters, terrorism, corporate failures and industrial disputes that have resulted in, amongst other things, serious disruptions to

supply chain and logistics activities. These events have highlighted the *vulnerability of* many *supply chains* and have shown that there is a risk to many supply chain and logistics operations that has not been adequately addressed. Many of these events are not directly related to the supply chain operations that are affected. For example, in the UK, a rise in the price of fuel for car drivers led to the blockading of fuel depots, which created a shortage of diesel for delivery transport, which in turn produced a general shortage of food because it could not be delivered to shops. There have also been examples of companies moving to a single source for the supply of a key component, only to find that the supplier becomes insolvent and cannot supply the component and that production at the company's plants is disrupted or halted.

Vulnerability has become more of an issue as the complexity of supply chains has increased dramatically in recent years. Thus, appropriate risk assessment techniques and contingency plans have been developed to enable supply chains to be more resilient.

MANUFACTURING AND SUPPLY. There have been many important developments in supply or inbound logistics. These have resulted from both technological and organizational changes. Within the context of raw material sourcing and production, these include:

- *New manufacturing technology* (CIM, etc), which can accommodate more complex production requirements and more product variations.
- *New supplier relationships,* with the emphasis on single sourcing and lean supply, thus enabling suppliers and buyers to work more closely together.
- *Focused factories,* with a concentration on fewer sources but necessitating longer transport journeys.
- *Global sourcing,* emphasizing the move away from local or national sourcing.
- *Postponement,* where the final configuration of a product is delayed to enable reduced stock-holding of finished goods in the supply chain.
- *Co-makership:* the development of partnerships between supplier and buyer to help take costs out of the supply chain through quality and information improvements. This represents a positive move away from the more traditional adversarial relationship that has been common between buyers and suppliers.
- *Co-location:* the joint physical location of supplier operations on or next to customer production sites.

Associated with many of these developments has been the impact of changes in product range. Typical examples include the shortening of product life cycles, the wider product range expected and provided, and the increase in demand for timesensitive products - especially fresh and prepared foods. These may all pose added logistics problems with respect to the impact on stock levels and in particular the speed of delivery required.

The results of a worldwide benchmarking programme in the automotive industry were published in a book called *The Machine that Changed the World* (Womack, Ross and Jones) in 1990. It identified huge opportunities for closing the gap between the best in the world and other manufacturers. The approach that was developed became known as *lean manufacturing,* and is based on the Toyota system of production management. The five principles of lean thinking concentrate on the elimination of waste and are as follows:

1. Specify what does and does not create value from the customers' perspective and not from the perspective of individual firms, functions and departments.

2. Identify all the steps necessary to design, order and produce the product across the whole value stream to highlight non-value-adding waste.

3. Make those actions that create value flow without interruption, detours, backflows, waiting or scrap.

4. Only make what is 'pulled' by the customer order just in time.

5. Strive for perfection by continually removing successive layers of waste as they are uncovered.

Lean thinking owes a lot to the philosophy of just-in-time and is an extension of this type of approach. A development of lean thinking is the concept of *the agile supply chain.* The emphasis is on the need for companies to work together across the supply chain in order to fulfil customers' requirements, and to be flexible in the way that they are organized for production and distribution. This will allow them to be responsive to any changes in customer requirements. The concept is one that recognizes the key importance of the final customer for a product and strives to set up a system and structure that can service these customer requirements in the most effective way. Agility is, therefore, about the development of a strategic structure and operation that allows for the rapid response to unpredictable changes in customer demand. Two dictionary definitions serve to emphasize the difference between lean thinking and the agile supply chain: *lean:* 'having no surplus flesh or bulk'; and *agile:* 'quick in movement, nimble'. Some of the reasons for the need for agility in the supply chain include:

• the dramatic shortening of product life cycles - PCs have about a six-month life cycle, and mobile phones become outdated in even shorter periods;

• the rapid increase in the variety of final products in terms of colour and style refinements;

• the build-up of stock, which can quickly become obsolete as demand requirements change so rapidly, in traditional supply chains;

• developments in direct selling and buying - notably via internet shopping – that mean that customer expectations of acquiring the most up-to-date products have become even greater.

The agile approach to supply chain management aims to create a responsive structure and process to service customer demand in a changing marketplace, although in many ways this merely echoes the methods of any organization that is set up to be responsive to customer requirements. Key characteristics of an agile approach are:

• Inventory is held at as few levels as possible.

• Finished goods are sometimes delivered direct from factory to customer.

• Replenishment at the different levels in the supply chain is driven by actual sales data collected at the customer interface.

• Production is planned across functional boundaries.

• Supply chain systems are highly integrated, giving clear visibility of inventory at all levels.

• Minimum lead times are developed and used.

• The principles of the postponement of production are practised.

• The majority of stock is held as work-in-progress awaiting final configuration, which will be based on actual customer requirements.

Factory gate pricing (FGP) is another initiative that is intended to reduce logistics costs – in this case the inbound supplier's transport costs incurred while delivering to customers' manufacturing sites or distribution centres. Traditionally, many products, particularly industrial components and raw materials, have been delivered direct to customers via suppliers' own transport or a third-party contracted to the supplier. This approach disguises the real transport cost because it is included within the cost of the product. Now, some products are bought 'at the factory gate' without any transport cost included, so that the product price is transparent. The buyer can then decide whether to ask the supplier to deliver, with the transport cost indicated separately, or to collect the product using its own, or third-party, resources that it controls. As well as the opportunity to reduce transport costs by improving the utilization of its own transport operations, this alternative approach also gives the buyer much more control over when goods are received and how much is received. This can help it to avoid stock-outs of essential products and to ensure that it does not become unnecessarily overstocked with any products.

DISTRIBUTION. In many ways, there have been fewer changes in the distribution elements of the supply chain than in most of the other elements. In an operational context, the major developments have been technology-based:

• 'new' vehicle systems — demountable bodies, etc;
• stockless depots operating cross-docking arrangements;
• paperless information systems, particularly in distribution centres;
• interactive routeing and scheduling for road transport operations.

An important and still expanding area is that of *third-party distribution,* or the outsourcing of distribution operations. This has been a significant feature of logistics in the UK for many years, and now many continental European countries have begun to follow the same track. The major advantage is that outsourcing allows a company to specialize in its own core business, be it manufacturing or retailing, without spreading its resources to cover distribution as well. There are still major opportunities in many markets. Most third-party contractors will now claim to have one or a number of specializations (food, hanging garments, etc), and many strive to provide an increased portfolio of 'value added' activities, which allows them to obtain additional business (relabelling, assembly, etc). There is currently a move to establish partnership arrangements, but the main questions are still whether to outsource at all and what to outsource.

One interesting innovation in distribution is the development of *freight exchanges,* which are online transaction systems for shippers and carriers that enable online freight purchasing. Basically, they are internet-based trading mechanisms that facilitate the matching of shipper demand with carrier availability. They range in complexity from simple electronic bulletin boards (these allow shippers and carriers to post their needs, manually compare the two lists and then contact each other) to sophisticated algorithms (these identify suitable matches through the filtering and comparison of rates, carrier performance, service offering and equipment types).

Almost all of the sites use some form of bidding process. This is likely to be a 'reverse auction' where a carrier makes a bid to provide the transport for a particular

freight movement and this bid stands until, and unless, another carrier comes in with a better (i.e. a lower) offer. There is a time deadline after which no more bids will be accepted. The reverse auction process tends to be liveliest shortly before the time deadline is reached. This indicates the various mechanisms that are used for establishing rates (bulletin boards, auctions, aggregation, etc), the different modes considered, the different types of owner and the matching processes. Many such exchanges have been born and have expired in just a few years. Initially, it was thought that these exchanges would take the place of the contract arrangements made between many shippers and carriers, but it is apparent that these contracts need to be negotiated face to face and that isolated internet contact is insufficient. Thus, exchanges are ideal for organizing 'spot' or occasional transport requirements but not for complicated long-term service contracts. An up-to-date list of exchanges can be found by interrogating search engines, such as Google, using 'Freight Exchanges' as the key words. Some sites provide very useful demonstrations of how they can be used.

Another very important development is the use of RFID: *radio frequency identification tagging.* This technology enables automatic identification through the use of radio frequency tags, data readers and integrating software. A tag has a microchip and an antenna that can store and transmit data and it can be fixed to individual products or unit loads. It can be active (send a signal) or passive (respond to a signal). The reader retrieves the data and sends them to the software, which can then interface with other logistics information systems. The potential of RFID is now much greater due to a number of factors:

- Prices of both tags and readers have fallen dramatically.
- A number of leading grocery retailers have started to introduce tagging.
- The performance of the tags has improved substantially in terms of better and faster data transmission.
- There is a greater requirement for tags, especially for the tracing of products for consumer protection and brand integrity.

RFID tagging is still more expensive than bar-coding, but the differential is fast reducing, and the opportunities for RFID tagging are much greater. A tag can hold substantial amounts of data, has read and write capabilities, does not require line-of-sight reading but can be read via proximity, is fully automated and virtually error-free, is more durable and can operate in harsh environments. The feasible advantages from their use are numerous and help to indicate the vast potential for the technology in logistics. Some examples are:

- tracking raw materials and work-in-progress through manufacturing;
- tracking finished goods and unit loads in DCs: this could reduce labour time and costs through automated check-in, order shipment verification and stock checking;
- tracking finished goods and unit loads to shops or customers: this should enhance service provision through more accurate and timely information on order status;
- tracking reusable assets such as pallets and roll cages: this should provide significant increases in asset utilization by reducing asset cycle time and enabling better asset management.

Finally, within the aegis of distribution, one distinctive feature of recent years has been a concentration on *improving asset utilization.* This has been demonstrated in many ways: in grocery distribution with the building of composite distribution

centres and the use of compartmentalized vehicles; the backloading of delivery vehicles; and the development of shared-user contract distribution. One grocery multiple retailer in the UK has integrated its entire transport operation so that all transport is centrally planned. This includes supplier deliveries and collections, primary movements between and to DCs, final delivery and packaging returns. The system uses linked technology: routeing and scheduling software, GPS, in-cab communication, etc. Although it is a complicated and time-consuming operation to plan and implement, the company has seen major improvements in the utilization of tractors, trailers and drivers, as well as a reduced impact from the problem areas of increased congestion, working time legislation and driver shortages.

RETAILING. In Europe as a whole there have been several trends in the retail sector that have had and will continue to have an impact on logistics and supply chain development. The importance of the grocery multiple retailers cannot be overestimated, as many logistics-related changes have emanated from this sector. In general, there has been a growth in multiple stores and a decline in independents. Overall the number of retail outlets is in decline, but the average size of outlets has increased considerably. A fairly universal development has been the growth of large out-of-town 'one-stop' superstores and hypermarkets. These changes have all had an influence on logistics strategies and operations. Perhaps the most far-reaching effect, however, has been from the combination of *inventory reduction* policies. These include:

- the maximization of retail selling space – at the expense of retail stockrooms;
- the reduction in DC stock-holding due to cost-saving policies;
- the reduction in the number of stock-holding DCs;
- JIT philosophies and concepts;
- vendor-managed inventory policies.

An important retailing policy has been the move to maximize selling space in stores, often at the expense of shop stockrooms. Developments in information technology have also been at the forefront, particularly the use of electronic point-of-sale systems, which provide a much more accurate and timely indication of stock replenishment requirements at shop level. Linked to this has been the introduction in the USA of vendor-managed inventory policies whereby the supplier rather than the retailer is responsible for shop stock replenishment. Finally, many retail operations have also adopted policies to streamline the activities within the retail environment through the movement of activities back into the DC (labelling, unpacking, etc). The consequences are that stocks and buffers in retail stores have been reduced or eliminated in favour of the continuous flow of products into the stores. This necessitates more responsive delivery systems, more accurate information and more timely information. Thus logistics operations must perform with greater efficiency but with fewer safeguards.

The out-of-stock problems created by inventory reduction at retail outlets have highlighted a number of other related issues. These are classified under the title of *'on-shelf availability'* or *'the last 50 metres'*. In its simplest definition, this refers to the ability to provide the desired product in a saleable condition when and where the customer wants it. This definition describes the effect of the problem but, in fact, there are many interrelated causes throughout the supply chain that can create the

problem. Product availability tends to reduce as the product moves through the supply chain. The Institute of Grocery Distribution (IGD) (2005) research indicates that manufacturers achieve about 98 per cent availability, which reduces to 95 per cent in retailers' DCs and to about 90 per cent by the time the product reaches the shelves in the shop.

Poor in-store execution can create shortages, due to lack of replenishment staff in shops, insufficient shelf space or ineffective stock management at the shop. It is estimated that loss of sales can be quite significant because, although some shoppers will delay purchase or purchase a substitute, most are likely to buy the product from another store. Seven areas for improvement in supply have been identified, the two most important being measurement and management attention. The others are to improve replenishment systems, merchandising, inventory accuracy, promotional management and ordering systems. These are areas that require collaboration from the different players in the supply chain.

THE CONSUMER. Linked directly with retailing operations is the gradual move into non-store shopping or *home shopping.* This phenomenon has been relatively common in the USA and Europe through the use of direct selling and mail order catalogues. It has now achieved 'breakthrough' levels in sectors such as grocery and made significant inroads into more conventional retail shopping. The means for such a change have been through the development of home computers, automatic banking and, of course, the internet. These changes have begun to have a fundamental impact on logistics. The very nature of the final delivery operation has, for home delivery, altered dramatically, and this has affected the whole of the supply chain. Typical implications are:

- shops become showrooms where stock replenishment is no longer an issue;
- a major increase in direct home deliveries;
- new distribution systems (small deliveries into residential areas, community depots, etc);
- existing delivery systems may have a new life (postal service, doorstep milk delivery);
- customer ordering systems may become linked directly to manufacturers' reordering systems;
- a high rate of returns – outside of the grocery sector, this can vary between 30 and 50 per cent.

This major move to non-store or home shopping has for many years always been 'just around the corner'. With significant advances in the spread of home computers and free use of the internet, it is now reasonable to say that its time has arrived. In some sectors (eg white goods, brown goods), home delivery has been common practice for several years. There are third-party contractors who specialize in home delivery. The rapid growth in online selling companies, such as Amazon, means that home shopping is now very common, with all the implications for logistics that e-fulfilment will bring.

It is important to differentiate between home shopping and *home delivery.* 'Home shopping' refers to the different ways of shopping for and ordering products from home. 'Home delivery' refers to the physical delivery of the product to the home. Those companies involved in grocery home delivery have, for example, developed specialist

vehicles that have compartments for the different types of grocery products: ambient, fresh, chilled and frozen. A number of different logistics solutions are still used for the storage and picking elements. The option of building specialist home delivery depots has generally not been successful. Most operations either stock and pick within designated areas of existing DCs or pick from the large retail hypermarkets. Some problems have already been identified, such as the number of picking errors that occur in this type of single-item picking operation, damage to the product and the less-than-perfect quality of some fresh food items. As companies become more familiar with and practised in these operations, these problems are reducing.

As well as delivery using conventional systems, other solutions that have been considered are the provision of secure boxes outside or attached to the property. As the average grocery delivery is likely to contain some chilled and some frozen goods, this approach may pose problems. Alternative points of delivery such as the place of work or the petrol station have also been tried with varying degrees of success. Picked and packed goods are delivered to await customer collection. Delivery drivers need to have very good interpersonal skills, as they are dealing face to face with customers in their homes. This will have implications for recruitment and training. If the goods being delivered require installation then the drivers will need appropriate training.

It should be re-emphasized that *customer service* continues to increase in importance and have a major impact on logistics, such that the logistics function has become the key element in customer service strategy. This includes:

- the development of 'customer-facing' organizations and operations;
- a move towards service policies based on market segmentation;
- JIT and quick-response systems requiring markedly more frequent and reliable delivery;
- 'brand image' becoming less strong - the dominant differentiator being availability.

One very recent example of the increasing importance of customer service has been the move to develop an alternative approach to the supply chain by creating what is called *demand chain management* (DCM). Here the intention is to move the emphasis away from the supply of products and towards the demand for products - to reflect the importance of what the customer requires rather that what the supplier wants to provide. Ultimately this is linking the two concepts of supply chain management (SCM) with customer relationship management (CRM), or linking logistics directly with marketing.

Information systems and technology are now capable of creating giant databases and information retrieval systems that allow for the manipulation and use of extreme amounts of very detailed data. The aim is, therefore, to integrate the two concepts and to eradicate the current isolation between producer and consumer and to do this by moving from supplier-facing systems and activities to customer-facing systems and activities. Perhaps this is only a subtle change in thinking - another new consultancy concept? - but it does have the good intention of emphasizing the need to concentrate on the customer rather than the supplier.

Text 4. Purchasing and Supply

Purchasing and supply, also known as procurement, are amongst the key links in the supply chain and as such can have a significant influence on the overall success

of the organization. Ensuring that there are sufficient supplies of raw materials at the right price, of the required quality, in the right place and at the right time is obviously crucial to any manufacturing plant. So important is this process that over the years many organizations have developed large departments to deal with the sheer weight of supplier transactions. Recently, however, many companies have been reducing the number of suppliers they deal with in order to reduce the cost of these transactions. In addition to supplier reduction programmes, many companies have tried to move away from the traditional adversarial relationship with suppliers and towards a more partnership-based approach. This style of relationship recognizes that both parties need to make a profit to survive but that there may be areas where, through co-operation, real cost may be removed from the supply chain. Of course, procurement is not just about raw materials. The following may also need to be acquired:
• utilities (gas, water, electricity and telephones); • fuel (diesel, petrol and heating fuel); • capital assets (machinery, vehicles and buildings); • corporate travel and hotels; • stationery; • consultancy; • outsourced services (distribution contracts, IT services, etc); • IT equipment (hardware, software and support).

Very large sums of money are involved in the above areas of purchasing, with different emphasis placed on different elements depending on the business of the organization concerned. For a transport company, fuel may represent as much as 35 per cent of the total operating budget, but for a manufacturing plant the major cost may be in the plant running costs. These costs need to be carefully managed, but the first step is to determine some purchasing objectives.

Managing suppliers is another crucial aspect of procurement. 'How many suppliers should we have?', 'How will we assess their performance?' and 'Should we make or buy this component?' are all key questions that need to be answered if a procurement strategy is to work to the benefit of the business. Procurement is a very large subject area. The objective in this chapter is only to highlight the key areas.

SETTING THE PROCUREMENT OBJECTIVES. When setting procurement objectives, consideration should be given to the following: • ensuring the supply of raw materials and other supplies; • vendor-managed inventory (VMI); • the quality of supplies; • product specification; • the price; • the origin of the supplies; • the method of supply, e.g. JIT-style deliveries; • the mode of transport used; • a hierarchy of importance, e.g. key raw materials would have precedence over office stationery; • whether to make yourself or buy from a supplier.

Ensuring the supply of raw materials

Clearly, without an assured flow of raw materials into a manufacturing plant serious problems will ensue. These could take the form of plant stoppages, which will be enormously expensive. If expensive plant, machinery and labour are standing idle then costs may be incurred at an alarming rate. Not only will cost be incurred, but customers may be let down, as goods are not available for delivery at the appropriate time. With this in mind, procurement management can adopt several policies to ensure that supplies are always in the right place at the right time:
• The manufacturer could purchase the supplying company. This used to be common in vertically integrated organizations.

• Sufficient safety stocks may be held at the manufacturing plant to cover such eventualities. These stocks would attract inventory carrying costs, but the alternative may justify this investment.
• A manufacturer may insist on the co-location of the supplier next to or close to the plant itself.
• Where commodities such as wheat or crude oil are concerned, then options to buy certain quantities may be negotiated in advance.
• A manufacturer may develop very close relationships with suppliers, for example by a system of quality-assured suppliers or vendor-managed inventory.

Vendor-managed inventory. Where VMI is used, the vendor takes responsibility for the inventory held in the client's premises. The vendor monitors inventory levels and organizes replenishment. Ownership of the inventory passes to the client when the inventory is utilized. For VMI to be effective, the management of information is crucial. Vendor and client have linked computer systems, often using electronic data interchange (EDI). This allows the vendor to monitor inventory levels and for purchase orders and invoices to be effectively transmitted between the partners. The main advantage of VMI is that the overall level of inventory in the client's warehouse can be reduced. The vendor is able to schedule deliveries efficiently, as it has better visibility of the client's requirements, and it can incorporate these requirements at an early stage into its production schedules. For the process to work, there need to be high levels of trust between the two partners. This is often derived from the cultural compatibility of the companies involved. The partners' IT systems also need to be compatible. Where the client retains an element of involvement in managing the vendor's inventory, this is referred to as co-managed inventory (CMI).

The quality of supplies. Ensuring that the goods and services purchased are of the right quality is important in that sub-standard supplies cause waste and a variety of problems:
• If the goods are unusable then their presence has created a shortage in the required quantity, which in JIT environments may be crucial.
• Sub-standard goods will need to be stored awaiting collection. This could be a problem if storage at the receipt stage is restricted.
• They will incur transaction costs, as paperwork and time will be involved in rectifying the error.
• They will undermine confidence in the supplier and the supply process.

Insisting on suppliers having quality management systems in place can help avoid these problems, as can extrinsic audits of suppliers' premises. These audits may be carried out by the company's quality auditors. Supplier assessment programmes will help highlight the main offenders.

Product specification. An important method of avoiding purchasing sub-standard supplies is the development of product specifications. If vendors are given very clear and precise instructions about what is being ordered, this will go a long way to avoiding costly misunderstandings. This is especially true where there are many different options associated with components of a product. For example, when purchasing a car the same model may be offered for sale with different types of

engine, gearbox, paintwork and interior trim. It is important that the choices made are clearly communicated in writing to the vendor in the form of a request for quotation (RFQ). Product specifications should also be included in the purchase order when it is issued to the supplier.

The price. This is the area that most people associate with the purchasing process. The price will be dictated by certain factors:

- The relative negotiating skills of the purchasing and selling team.
- The quality of the goods in question.
- Detailed knowledge of the product being purchased. For example, when multiple retailers purchase commodities such as flour they will have familiarized themselves with the costs of wheat and production before entering any negotiation.
- How much of the product is generally available for purchase. In other words, if the product is scarce then prices tend to be higher as purchasers pay higher and higher prices for the goods. The opposite is true when the product is plentiful.
- The distance the goods have to travel from their point of origin to the delivery point. Associated with this is the mode of transport used. The cost of transporting the raw materials may represent a large part of the purchase price.
- If the goods are being purchased by a buying group, then prices should be lower. A buying group is a number of companies grouped together in order to pool their buying power. If the product specification can be defined precisely, then prices can be assessed on a like-for-like basis between suppliers.

The origin of the supplies. In recent years many large organizations have decided to source their supplies offshore. The logic for this trend is that, in some parts of the world, such as China and India, the costs of labour and production are very low. Companies can therefore potentially gain a significant competitive advantage by offshore sourcing. However, a number of factors need to be taken into account. If the goods have to travel halfway around the globe then not only will the transport costs be high but the lead times to delivery may be unacceptably long. In addition, pipeline inventory will be increased if sea transport is used. This can have the effect of impeding market responsiveness due to the long replenishment lead times. There are inherent problems with regard to dealing with different country's cultures. Further to this, the documentation associated with international sourcing is diverse and complicated. Dealing with different cultures and international documentation requires specialist knowledge and expertise. It is also the case that not all parts of the world enjoy political stability. If supplies are interrupted for unspecified periods of time by political strife then a company could be in dire trouble if it does not have an alternative source of raw materials. Important decisions must be made with these factors in mind.

The method of supply. Smaller, more frequent deliveries typify a JIT system of supply. Inventory carrying of raw materials maybe measured in hours only, and deliveries may even be made directly to the production line itself. As more and more companies seek to reduce inventory carrying costs then these types of arrangement have become more common. The process of receiving goods in a warehouse can be significantly speeded up if suppliers provide the goods in the right quantities, at the allotted time, correctly labelled and bar-coded where necessary. How the raw materials are to be supplied needs to be determined and then discussed in advance

with suppliers because they may not be able to meet the necessary criteria. It will be no good insisting on bar-coded products if a supplier is unable to comply and, if a supplier cannot comply, a buyer's receiving operation may be severely compromised.

The mode of transport used by suppliers. Many transport and delivery requirements need to be discussed prior to agreeing to deal with a supplier. In the past, company procurement managers have in some instances been guilty of making spot purchases of goods on the basis of price alone only to discover that the consequential cost of handling has been unreasonably high. Typical questions that need to be answered include: • Will the goods be shipped by road, sea, rail or air?
• What sort of unitization is used? • Will the goods be on pallets? • What size are the pallets? • Will the goods be stuffed loose inside containers and require considerable time and labour cost to unload? • Should a railway siding be built to accommodate rail traffic?

The hierarchy of importance. In our visits to firms, it never ceases to amaze us how most purchasing departments still treat a critical microchip in the firm's key product much the same as a paperclip purchase. (Jack Berry, Arthur D. Little Inc) This quotation says it all really. It is vital that appropriate amounts of time and effort are spent on the purchases that most matter to the organization. Therefore procurement management must ensure that purchasing is segmented accordingly. Products need to be classified according to their criticality to the business and the value of annual purchases. The four categories usually used are: 1. routine purchases; 2. commodities; 3. critical items; 4. strategic items.

A strategic item is one that is both very critical to the business and has a high annual purchase value. At the other end of the scale, a routine purchase is one that has a low annual purchase value and is not critical to the business. Once purchases have been categorized in this way, the process by which they are to be purchased may be decided upon. Buying processes include: • online catalogues; • tendering;
• a system of approved suppliers; • strategic partnerships.

Online catalogues available to employees will allow them to purchase routine items quickly and easily. This speeds up the process and limits the cost of these transactions. The tendering process for high annual purchase value commodities will be appropriate where obtaining the best price is important. A network of approved suppliers and a formal system for approving suppliers are most appropriate where items are critical to the business but have a low annual purchase value. Suppliers will have been able to satisfy the purchasing department that they are able to meet certain criteria satisfactorily on a consistent basis. The criteria used may include delivery reliability, quality of goods supplied and value for money. Strategic partnership will be most appropriate where the purchase has high annual value and is critical to the business. In these cases, it is in the interest of both purchaser and vendor to develop a strong working relationship. A practical example demonstrates this: Texas Instruments were able to save in excess of $30 million by redesigning their procurement process. In some cases they were able to reduce the transaction costs associated with line items from $250 for a manually processed order to less than $5. These kinds of saving were achieved by using the following approach:
• Each division of the company had its own procurement system. This was changed so that the buying power of the whole company could be exploited.
• The supplier base of 34,000 was significantly reduced.

• Business processes were carefully examined and unnecessary steps or procedures eliminated. This saved both time and money.
• The newly streamlined processes then formed the basis of their computerized paperless procurement model.
• EDI links were established with suppliers internationally.
• Online catalogues of items were made accessible to employees. This system, known as Express Buy, allowed employees to select the everyday items they needed with speed and ease, the terms and conditions of these purchases having already been negotiated by the buying team.
• Savings were generated in labour costs and inventory carrying, buying power was consolidated on a global scale, and the need to expedite critical parts orders was reduced.

These kinds of improvements and savings were not generated overnight. Texas Instruments started this process back in the 1980s but they had a clear idea about what they were seeking to achieve.

Make or buy? The decision to make goods or provide a service as opposed to buying it in is one that is rarely straightforward. It is not always simply a question of cost. Other issues such as the company's reputation or production capacity may be included in the mix. The following is a list of some of the factors often considered:

• *Cost.* If the goods or services are to be provided in-house, then it is not simply the direct costs involved that need to be considered but the wider costs, such as the opportunity cost of the capital employed. In other words, could the capital tied up in this exercise produce a better return if invested in another activity? If the activity is to be provided by a supplier, then the costs associated with managing the supplier and the transaction costs (e.g. for processing invoices) should be included in the analysis.

• *Ensuring supply. As* mentioned above, if goods or services are not available when required then significant extra costs may be incurred. The reliability of the supplier and the quality of its offering is another crucial part of the decision-making process.

• *Production capacity.* Some parts of an operation may be provided by subcontractors
because a company does not have sufficient capacity within its operation to do the job itself. This may be a very sensible approach to take in certain circumstances. *A* vehicle fleet, for example, should be kept working full time. Therefore, it is better to have sufficient vehicles to achieve this end and subcontract any further work created by short-term increases in demand. Of course, the opposite is true in that if a production plant has spare capacity then it may be correct to use it rather than have it stand idle.

• *Competitive advantage.* There may be certain products, components or processes that the company wishes to keep secret and so it will not allow any other company to gain information about them. *A* revolutionary new product may fit this situation.

MANAGING THE SUPPLIERS. The following areas should be considered when managing suppliers: • who the suppliers will be; • how many suppliers there will be; • how suppliers will be managed – adversarial or partnership approach.

Who the suppliers will be. Choosing your suppliers will involve all the elements already discussed, but there are one or two further points that have to be considered. Of course, this only applies in a situation where there is a choice. There are certain situations where no choice exists at all and one is forced to deal with a monopoly situation. If a partnership approach is desired then suppliers need to be

able to respond to this type of situation. They must also be companies that are sufficiently well established. Company accounts are public information and easily obtained. A check should be made to establish that a company is financially stable. It would be very unfortunate to spend time developing a partnership only to see a new partner going into liquidation.

Another consideration is whether or not a supplier wishes to become closely involved with a major customer. It will be necessary to share information, and the supplier may also deal with competitors. This could place a supplier in a difficult position and it may decline the offer of closer ties. Another fear may be that the customer could become so close that it gets taken over.

How many suppliers there will be. This will obviously vary from industry to industry. The high costs associated with transactions are driving companies into supplier reduction programmes. The suppliers who remain will hopefully be the ones who perform best on supplier appraisals. They will also be the ones who have been prepared to share information and get involved in EDI to reduce the cost of purchasing and who have the geographical coverage to match the client company. Increasingly, global companies are seeking to do business with global suppliers.

A partnership or adversarial approach. In a traditional adversarial relationship between buyer and seller each party sees itself as being in competition with the other. The inevitable result of this kind of relationship is that one or other party inevitably 'wins' in any negotiation. This is often referred to as a 'win-lose' situation. Who and why one party is successful in this sort of relationship has much to do with the relative power that resides in one camp or the other. For example, a vendor with a rare product that is absolutely crucial to the process of the buyer would tend to be in a more powerful position. This would be especially true if the item on sale could not be substituted by another. The problem with this type of association is that, because both parties are secretive and defensive, inefficiencies in the supply chain are the result. These usually take the form of excess buffer stocks held by both parties, stock-outs and a lower level of customer service.

The idea of seeing a supplier as a partner makes a great deal of sense from a logistics point of view. The Toyota organization, like many other Japanese companies, has long seen its suppliers as co-makers of the product. The Japanese system of keiretsu epitomizes the approach. A network of suppliers is intimately bound to the client company in a complex web of interdependence. This type of association should be seen as a 'win-win' situation in which both parties gain more from the relationship than from the adversarial style.

It is worth introducing a word of caution at this point. Toyota reduced its supplier base to such an extent and was so reliant on JIT deliveries that when a fire occurred at the premises of one of its suppliers it was forced to stop its production lines in Japan for a week. At the time, Toyota owned 22.6 per cent of the supplier, Aisin Seiki, a manufacturer of vital brake components. The fire occurred early in 1997 and brought Toyota to a standstill. This was not an isolated incident either, because in 1995, after the Hanshin earthquake in western Japan, car manufacturers were cut off from some of their suppliers by the disaster. By contrast, Honda does not have such a closely knit keiretsu and has a policy of dual supply for all raw materials as a hedge against just such a situation.

These are extreme examples and should in no way inhibit companies from building closer ties for mutual benefit. As with all partnerships, the partner has to be selected with care, as not all suppliers will either wish to engage in this sort of relationship or be suitable. In practice it is usually the partner with the more power that dictates the terms of the partnership. It is very difficult for a small company to approach a larger company with a view to instigating such a partnership. A lack of equality in the partnership will lead to the more dominant partner dictating terms regarding many aspects of the relationship. This phenomenon has led some commentators to question whether a true partnership can ever exist between two commercial parties when one partner holds most of the power. Nevertheless clear advantages have been documented where two companies work more on a collaborative basis than an adversarial one. Some prerequisites for a successful partnership will include: • compatible cultures; • high levels of trust already in place; • compatible computer systems to aid the electronic sharing of information; • the financial stability of both parties; • a willing attitude to exploring the advantages of partnership.

In a partnership, members of equivalent departments in both organizations will meet regularly to discuss areas of mutual interest. For example, new product development people from both organizations will sit down together to see how products may be produced in such a way as to avoid causing problems for each other. In a similar way, logistics personnel will associate more freely. Traditionally, in the old adversarial way, only buyer and seller would meet. Through this closer liaison, information sharing occurs for mutual benefit. Real benefits have been achieved by linking together computer information systems. In this way, a retailer with an electronic point-of-sale (EPOS) system can provide the supplier with real-time data about the current level of demand for a given product. This kind of information can lead to real reductions of inventory carrying in the supply chain and a reduction in stock-outs. As the relationship matures then initiatives such as VMI may be introduced. Ordering and invoicing may be carried out via EDI, thus reducing transaction costs by the removal of expensive paper-based systems.

COLLABORATIVE PLANNING, FORECASTING AND REPLENISHMENT. As the name implies, collaborative planning, forecasting and replenishment (CPFR) is a collaborative business process where two companies work closely together to improve the efficiency of their supply chains. The client and the supplier will link their computer systems to the extent that the supplier has visibility of the inventory held by the client as well as the latest sales and forecasts for the line items involved. Information regarding promotional activity will also be shared with the supplier.

Despite the compelling logic for adopting such an approach to efficient replenishment, take-up has been slow. Some of the reasons for this relate to the difficulties in aligning the two parties' IT systems as well as their business processes. Fears about the security of sensitive market information have also hampered progress. A further reason has been the practical difficulties of agreeing how to share the overall benefits, particularly where higher costs may be incurred by one party in the supply chain. However, some large organizations such as Procter & Gamble have found success using this process.

A survey of 21 companies in the USA reported the following benefits of CPFR: • improved relationship with trading partners (57 per cent); • increased service levels (38

per cent); • reduced stock outages (38 per cent); • increased sales (38 per cent); • decreased inventory (29 per cent); • forecast accuracy (29 per cent); • improved internal communications (24 per cent); • better asset utilization (14 per cent).

FACTORY GATE PRICING. This is sometimes also referred to as purchasing on an 'ex works' basis. This is very often one area associated with the buying process that is overlooked, although in recent years it has been more widely discussed. The cost of transporting the goods to the buyer's facilities may hide some extra cost that the buying company could avoid. Often companies show a remarkable lack of interest in this area, preferring to see it as somebody else's problem. The reality is that some costs could be eliminated and a higher level of control over the inbound supplies may be achieved. If raw materials are being sourced from a variety of locations, whether it is on a national, continental or global scale, then there may be a possibility of removing some of the associated transport costs by employing a third party to co-ordinate this process. Large freight-forwarding companies may be able to pool one company's transport requirements with others so that a better price is obtained.

Another way of removing cost from the inbound side of a business is to use the vehicles delivering finished goods to collect from suppliers. This will allow a company to buy raw materials at ex-works prices and utilize its delivery fleet more effectively as well. It may be possible to have the same organization that handles final deliveries co-ordinating inbound raw material transport needs as well.

E-PROCUREMENT. Procurement professionals have seen the benefits of the widespread use of the internet and IT systems in general. The internet has opened up a global marketplace for both consumers and professional buyers alike. Web-based companies such as eBay have created a vast auction site that connects buyers and sellers all over the world. Some industries have created industry-specific portals that facilitate the connection of suppliers and buyers. The internet can be used not only for the purchase of certain goods but the delivery as well. For example, software, music and films may all be delivered in this way.

Other manifestations of e-procurement include:
• online auctions where pre-qualified bidders compete to win contracts or buy assets;
• sending and receiving of documents such as purchase orders, bills of lading, RFQ, invoices and delivery confirmations; • the use of online catalogues. The portals may also be used earlier in the process for facilitating collaborative product design.

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