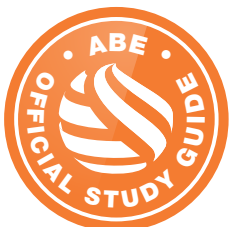


Your road to success

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# LEVEL 5 OPERATIONS MANAGEMENT



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# Using your study guide

Welcome to the study guide for **Level 5 Operations Management**, designed to support those completing their ABE Level 5 Diploma.

Below is an overview of the elements of learning and related key capabilities (taken from the published syllabus).

Element of learning	Key capabilities developed
Element 1 – Introduction to operations management	<p>Awareness of the operations function and its importance to business organisations</p> <p>Appreciation of the role of quality management and how it integrates with operations management</p> <p><i>Understanding of business functions, inter-functional working, quality management, responsibilities, transformation processes</i></p>
Element 2 – Supply chain and supply chain management	<p>Awareness of supply chains and ability to undertake supply chain mapping</p> <p>Ability to identify and manage supply chain risks</p> <p>Appreciation of sustainability and ethical supply chain practices</p> <p>Ability to identify areas for improvement and how to approach them</p> <p><i>Understanding of business functions, sustainability and ethical awareness, risk management, continuous improvement</i></p>
Element 3 – Procurement	<p>Ability to discuss the objectives of purchasing</p> <p>Ability to show an awareness of the strategic importance of purchasing</p> <p>Ability to analyse various approaches to procurement available to business organisations</p> <p><i>Understanding of business functions, strategic approaches to business functions, supplier relationships</i></p>
Element 4 – Logistics management	<p>Ability to demonstrate an awareness of logistics and logistics management</p> <p>Appreciation of organisational logistics management considerations in order to put logistical plans into place</p> <p><i>Planning, risk management, strategic approaches to logistics, decision-making, partnerships and supplier relationships</i></p>

This study guide follows the order of the syllabus, which is the basis for your studies. Each chapter starts by listing the syllabus learning outcomes covered and the assessment criteria.

## L5 descriptor

Knowledge descriptor (the holder...)	Skills descriptor (the holder can...)
<ul style="list-style-type: none"><li>• Has practical, theoretical or technological knowledge and understanding of a subject or field of work to find ways forward in broadly defined, complex contexts.</li><li>• Can analyse, interpret and evaluate relevant information, concepts and ideas. Is aware of the nature and scope of the area of study or work.</li><li>• Understands different perspectives, approaches or schools of thought and the reasoning behind them.</li></ul>	<ul style="list-style-type: none"><li>• Determine, adapt and use appropriate methods and cognitive and practical skills to address broadly defined, complex problems.</li><li>• Use relevant research or development to inform actions. Evaluate actions, methods and results.</li></ul>

The study guide includes a number of features to enhance your studies:



**'Over to you'**: activities for you to complete, using the space provided.



**Case studies**: realistic business scenarios to reinforce and test your understanding of what you have read.



**'Revision on the go'**: use your phone camera to capture these key pieces of learning, then save them on your phone to use as revision notes.



**'Need to know'**: key pieces of information that are highlighted in the text.



**Examples**: illustrating points made in the text to show how it works in practice.

**Tables, graphs and charts**: to bring data to life.

**Reading list**: identifying resources for further study, including Emerald articles (which will be available in your online student resources).

**Source/quotation** information to cast further light on the subject from industry sources.

**Highlighted words** throughout denoting glossary terms located at the end of the study guide.

### Note

Website addresses current as at September 2017.

# Chapter 1

# Introduction to Operations Management

## Introduction

Operations is both a function and a set of activities in an organisation. In simple words, operations is about the creation of **goods** and **services** in an organisation. This chapter discusses the meaning and purpose of operations, the fundamental building blocks of operations, the factors that influence operations, and the importance of operations management in the achievement of an organisation's goals.

Quality is an important attribute of **effective** operations, so this chapter also discusses the concept of quality, its purpose and significance, and the importance of cultivating a culture of quality in an organisation.

This study guide uses the term "operations" (as singular) instead of operation. Depending on the context, goods and services are collectively referred to as "products". Operations is discussed only in the context of a business organisation, which will be referred to as "the focal organisation/organisation".

## Learning outcome

After completing the chapter, you will be able to:

### 1 Analyse the role and importance of operations management

## Assessment criteria

### 1 Analyse the role and importance of operations management

- 1.1 Discuss the role of operations management in an organisation
- 1.2 Discuss the importance of quality and quality management and its integration with operations management

# Level 5 Operations Management

## 1.1 Role and purpose of operations management

### What is operations management?

#### CASE STUDY: FEDEX

##### The scale of operations

FedEx is the world leader in the package delivery services industry. Since it began operations in 1973, this US corporation has grown into a global giant. In 2017, its revenue exceeded US\$60 billion, which, according to senior managers at FedEx, is because of the boom in **e-commerce**.



FedEx is organised into four separate businesses: FedEx Express, FedEx Services, FedEx Ground and FedEx Freight. Each one serves a different market segment. Recently, it acquired one of its rivals' organisations – TNT Express – which is now being integrated into FedEx Express.

FedEx Express is the largest of the four businesses, and accounts for 57% of the corporation's total revenue. Each business day it delivers more than 4 million shipments of "documents, parcels and freight" in over 200 countries. Its 2017 sales revenue was more than US\$34 billion.

FedEx Express defines itself as a provider of "rapid, and time-definite" shipment delivery services, and takes pride in delivering "optimal service quality and reliability".

FedEx Express aims to improve its performance by being more **efficient**. In particular, it aims to reduce the time and resources required by some of its internal processes, and modernise its logistics by using vehicles and aircraft that are more cost-effective and fuel-efficient.

*Source: Adapted from <http://investors.fedex.com/company-overview/fedex-express/strategy/default.aspx>*

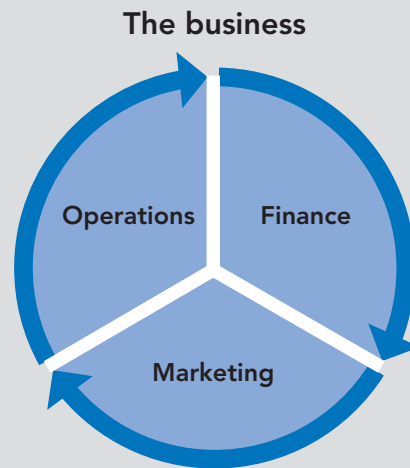
The term "**operations**" should not be confused with "**operational**".

Operational refers to short-term, day-to-day plans and action. It is the opposite of strategic or long-term plans and action.

Operations refers to the resources and processes that create and deliver products in order to meet customers' requirements.

The three basic functions of a business that helps them achieve its objectives are:

- operations;
- marketing;
- finance (see Figure 1).



**Figure 1:** Basic functions of a business



A few examples of operations are presented in Table 1.

Type of business	Operations
Fast food business	Source ingredients from external suppliers. Produce and serve a chicken burger to a customer at the sales counter.
Airline	Source high-quality, packaged meals and serve them to passengers.
Department store	Partner with overseas apparel factories to supply quality clothing to sell in the domestic market.
Manufacturing organisation	Seek transportation services to move manufactured items from factory to warehouse for storage, or to a retailer for sales.
Online grocery shop, restaurant	Deliver goods to customers within specified timeframe to fulfil their orders.
Mobile phone service provider	Transmit mobile text message from a subscriber's phone to a receiver's phone.
Courier and package delivery service provider	Collect shipments of documents from senders (customers) and deliver these packages on time to correct addresses in domestic and overseas locations.

**Table 1:** Examples of operations for different types of businesses





Operations management is defined as:

“ a function that involves processes driven towards efficient and effective management of resources to create output in the form of tangible goods and/or intangible services that can fulfil specific customer requirements. ”

Slack, Chambers and Johnston (2010)<sup>1</sup>

Another definition is:

“ the design, operation and improvement of the internal and external systems, resources and technologies that create and deliver the organisation’s primary goods and service combinations. ”

Lowson (2002)<sup>2</sup>

Both definitions tell us that:

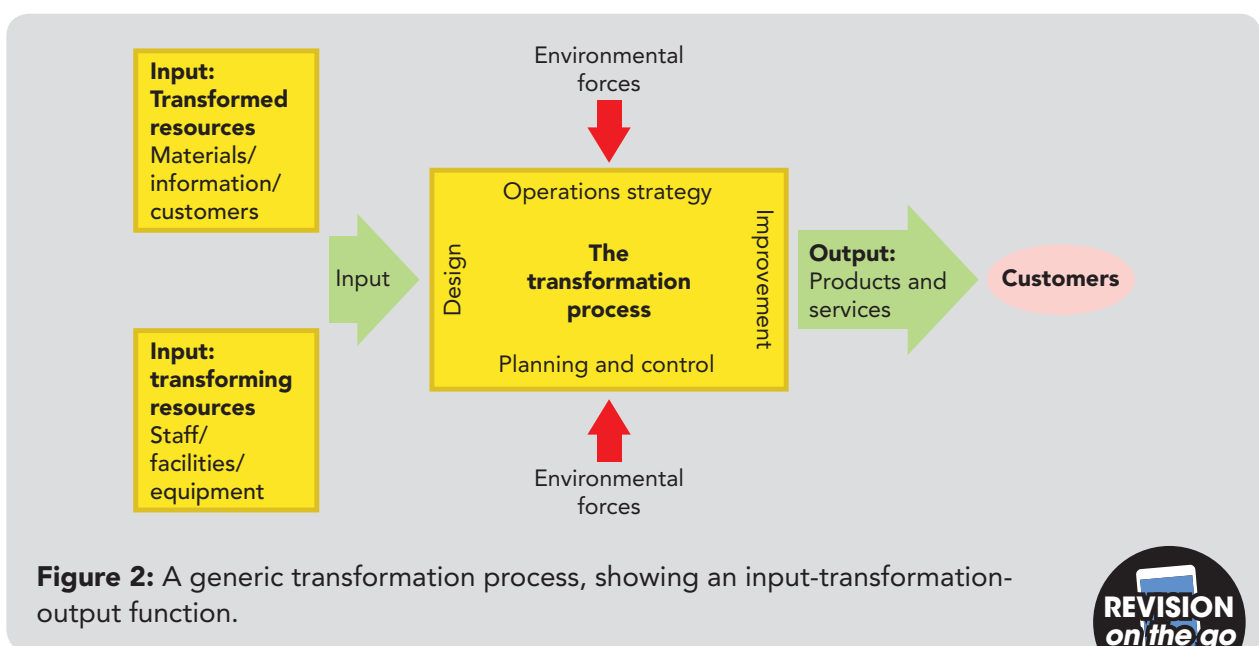
- the operations function is responsible for creating and delivering products;
- the primary aim of operations management is to meet customers’ requirements;
- high performance operations satisfy customers’ expectations, but with minimum costs for the business.

## The transformation process

Operations management is a transformation process. The components of an operations **system** are:

- **transformed resources** (e.g. materials that are transformed into something else);
- **transforming resources** (e.g. staff and equipment that does the transforming);
- **outputs** (the new products and services that are sold to customers).

Figure 2 shows a generic transformation process. Its components are explained in Table 2.



<sup>1</sup> Slack, N., Chambers, S., and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall

<sup>2</sup> Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge, p. 5

<b>Transformed resources</b>	<p>These are the basic resources that operations needs to create products. For example, a furniture company's operations needs wood. Similarly, a computer software company cannot create software unless they have staff who have the appropriate programming skills.</p> <p>Transformed resources can be raw material (e.g. steel, plastic, wood, paper), information (e.g. knowledge and data) or even customers.</p>
<b>Transforming resources</b>	<p>Products are not created from transformed resources by magic. The transformation requires transforming resources: people or machines, or both. For example, an airline needs flight attendants to deliver excellent service if it wants to survive and grow. These human resources transform their ability and training into high-class service that they deliver to passengers. An automobile manufacturer fulfils its customer requirements using a blend of people and machines.</p> <p>Transforming resources can be facilities (e.g. buildings and equipment), information (e.g. knowledge and data) or even customers.</p>
<b>Outputs</b>	<p>Transforming resources acting on transformed resources produce either tangible goods or intangible services (products) or a combination of both. For example, a fine-dining restaurant meets its customers' requirements by offering a combination of goods and services. It uses its facilities, chefs' culinary skills and cooking equipment on ingredients to produce a tangible gourmet meal which is served to a customer as part of a high-quality hospitality service by well-trained staff. However, an accounting organisation or a law organisation offers only services to its customers.</p>

**Table 2:** Components of the operations system



## ! NEED TO KNOW

Operations does not mean operational. Operations is one of the core functions in an organisation. Along with the marketing and finance functions, operations contributes directly to the achievement of an organisation's objectives.



Every type of organisation has operations. The key differences are in the nature and use of the transformed resources and transforming resources, and the volume and variety of output. Table 3, adapted from Stevenson (2014)<sup>3</sup>, shows the important decisions which the operations function is responsible for.

<sup>3</sup> Stevenson, W.J. (2014), *Operations Management*, 12th edition. McGraw-Hill Education, p. 17

Decision-making in operations management				
What?	When?	Where?	How?	Who?
What kind of resources?	When do we need each resource?	Where will the work be performed?	What product design will we use?	Who will be responsible for work?
What quantity of resources?	When will the work be done?		How will we allocate resources?	
	When do we need to order material and supplies?		How will the work be done (methods and equipment)?	

Source: Adapted from Stevenson (2014)

**Table 3:** Decision-making in operations management

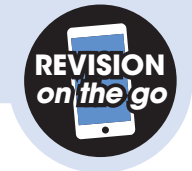


**! NEED TO KNOW**

Operations has two dimensions:

- 1 as a set of resources and processes
- 2 as a basic function

The operations function involves transformation of specific inputs into output (goods and services) that meet customers' requirements.



**✎ OVER TO YOU**

**Activity 1: Anatomy of a complex product**

Access the corporate website of Rockwell Collins from the link below and answer the following questions:

[https://www.rockwellcollins.com/Our\\_Company.aspx](https://www.rockwellcollins.com/Our_Company.aspx)

What kind of goods and services does Rockwell Collins offer?

What kind of organisation does Rockwell Collins supply its products to?

 OVER TO YOU**Activity 2: Argos digital retail operations**

Access the news report “Retailer takes the sting out of peak seasons, boosts customer service levels” (Bond, 2017) in Logistics Management from the link below and answer the following questions:

[http://www.logisticsmgmt.com/article/retailer\\_takes\\_the\\_sting\\_out\\_of\\_peak\\_seasons\\_boosts\\_customer\\_service\\_levels/software](http://www.logisticsmgmt.com/article/retailer_takes_the_sting_out_of_peak_seasons_boosts_customer_service_levels/software)

How many customer transactions do they have per year?

How many products do they produce?

How many deliveries do they make?

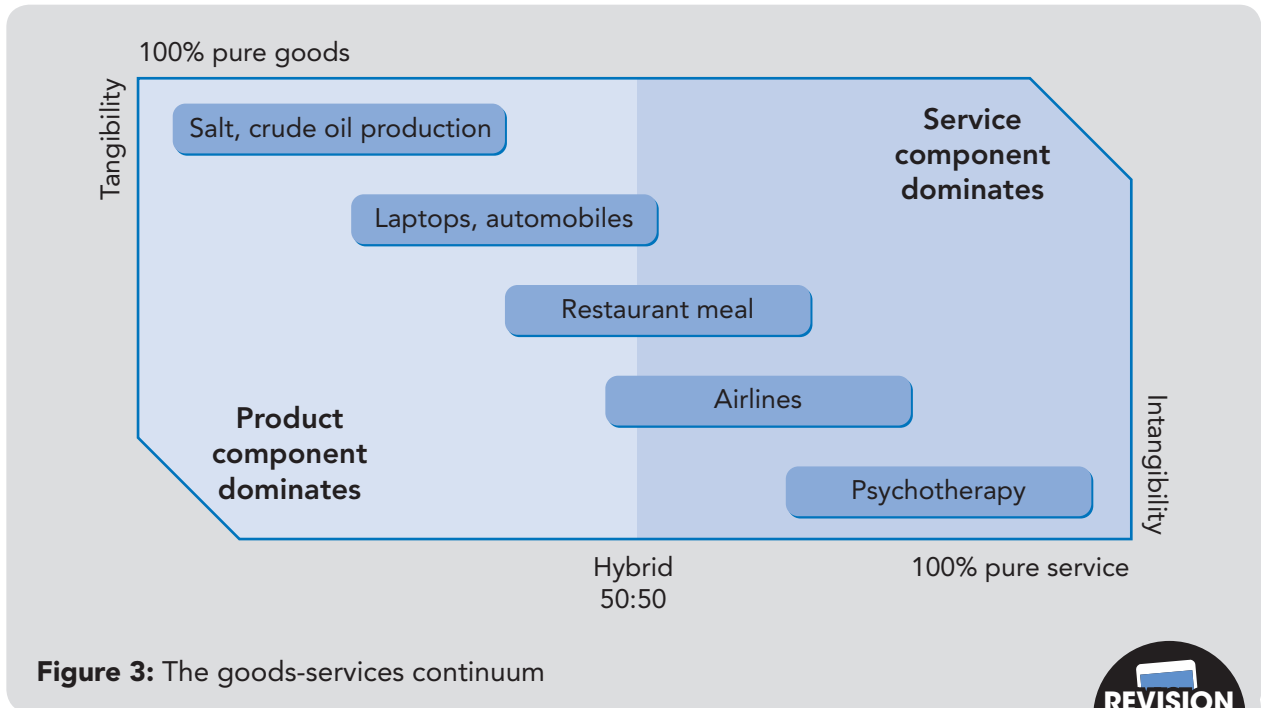
How many delivery vans do they have in the vehicle fleet?

How many transportation routes do they manage?

## The difference between goods and services

The output of the transformation process is: goods, services, or a combination of both. Lowson suggests it is important to differentiate between goods and services.<sup>4</sup>

While many business operations create output that is a combination of goods and services, there are many types of business operations that produce only goods, and many others that produce only services. This is illustrated in Figure 3.



**Figure 3:** The goods-services continuum



Goods and services have different attributes and behaviours, which affect operations management and **operations strategy**, as shown in Table 4.

Attributes of services	Attributes of goods
<p>Services are characterised by inseparability. This implies that production and consumption are simultaneous. Services are mostly produced by staff, and therefore may have high variability. For example, two flight attendants on the same flight can each deliver a different quality of in-flight service.</p>	<p>The production and consumption of goods are mostly separated by space and time. Goods often need storage and distribution logistics. Technology can produce standardised goods, which eliminates variability. For example, two laptops produced in a single batch are similar, if not identical, in design, shape and size.</p>
<p>Services are intangible. Operations delivering only services do not result in inventory, and therefore require no storage, eliminating the need for warehousing.</p>	<p>Goods are tangible. Their physical nature leads to inventory, which involves planning and strategy for warehousing facilities, transportation and material handling.</p>

<sup>4</sup> Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge

Attributes of services	Attributes of goods
There is a low possibility of automation.	Large-scale automation can be used to produce goods.
Staff, not services, require transportation. Logistics is comparatively simpler.	Goods require transportation. The nature of goods determines logistics.
Production facility can be relatively small.	Space is required for production.
Measurement of the quality of a service is relatively complex.	Measurement of a product's quality is straightforward.
Production and consumption usually take place at the same location, and usually at the same time. Distribution of services is therefore more localised.	Production and consumption may be separated by distance and time, which requires transportation and warehousing planning and strategy. Distribution may be on a global scale.

Source: Adapted from Slack, Chambers and Johnston (2010)

**Table 4:** Differences between goods and services



## ! NEED TO KNOW

Goods and services are different types of outputs due to their production, storage, transportation, distribution and consumption characteristics.

Goods are tangible, and production and consumption can be separated by space and time. A batch of goods does not show variability.

Services are intangible, and their production and consumption are inseparable in space and time. Because services are produced by people, they can be of differing quality.



## ✎ OVER TO YOU

### Activity 3: The transformation process

#### 1 Write down the operations' inputs, processes and outputs for:

- a luxury cruise ship
- an electricity provider (utilities company)
- an in-flight catering organisation
- a car mechanic

#### 2 Categorise the outputs into goods and services.



## OVER TO YOU

### Activity 4: Differences in operations

**How is the operations of a fast food outlet different from the operations of a fine-dining restaurant?**

## The operations function

Operations is as important for an organisation as breathing is for a human because when operations ceases, the organisation ceases to perform.

The operations function is defined as:

“A collection of processes spread across various departments within the organisation.”

*Slack, Chambers and Johnston (2010)<sup>5</sup>*

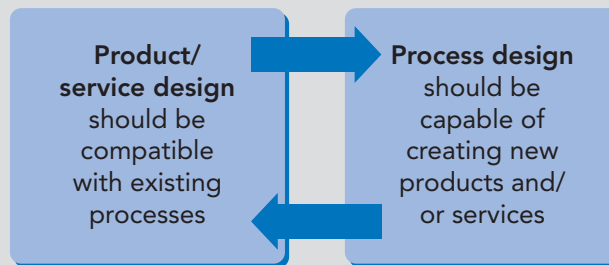
<sup>5</sup> Slack, N., Chambers, S., and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall

Here, the term “process” is defined as:

“An arrangement of resources that produce some mixture of goods and services.”

Slack, Chambers and Johnston (2010)<sup>6</sup>

Slack, Chambers and Johnston state that the design of the product or service and the design of the process must be in tandem. This relationship is shown in Figure 4 and an example is explained in the following case study.



Source: Adapted from Slack, Chambers, and Johnston (2010)

**Figure 4:** Relationship between product and process design



## CASE STUDY: RYANAIR

### Trade-off in the design of new seating in its aircrafts

Ryanair is a low-cost European airline. It flies an average of 300,000 passengers per day in more than 1800 flights from 85 bases, flying people to and from 200 destinations in 33 countries. Its fleet comprises over 600 Boeing 737 aircrafts, almost half of which are newly purchased.

Ryanair has redesigned seating in its new aircrafts. The “ergonomic slimline seats” mean that each plane will now seat 197 passengers, instead of 189, and each passenger will have one extra inch of legroom. However, unlike seats in almost all other airlines, there won’t be any seat-back pockets to hold personal items such as water bottles and magazines. The airline says that they are removing the seat-back pockets to cut down on “check and clean” time taken by cabin crew.



By eliminating this activity in the process of preparing the aircraft for flight, the airline aims to reduce cleaning costs, and have a turnaround time that is better than that of their competitors.

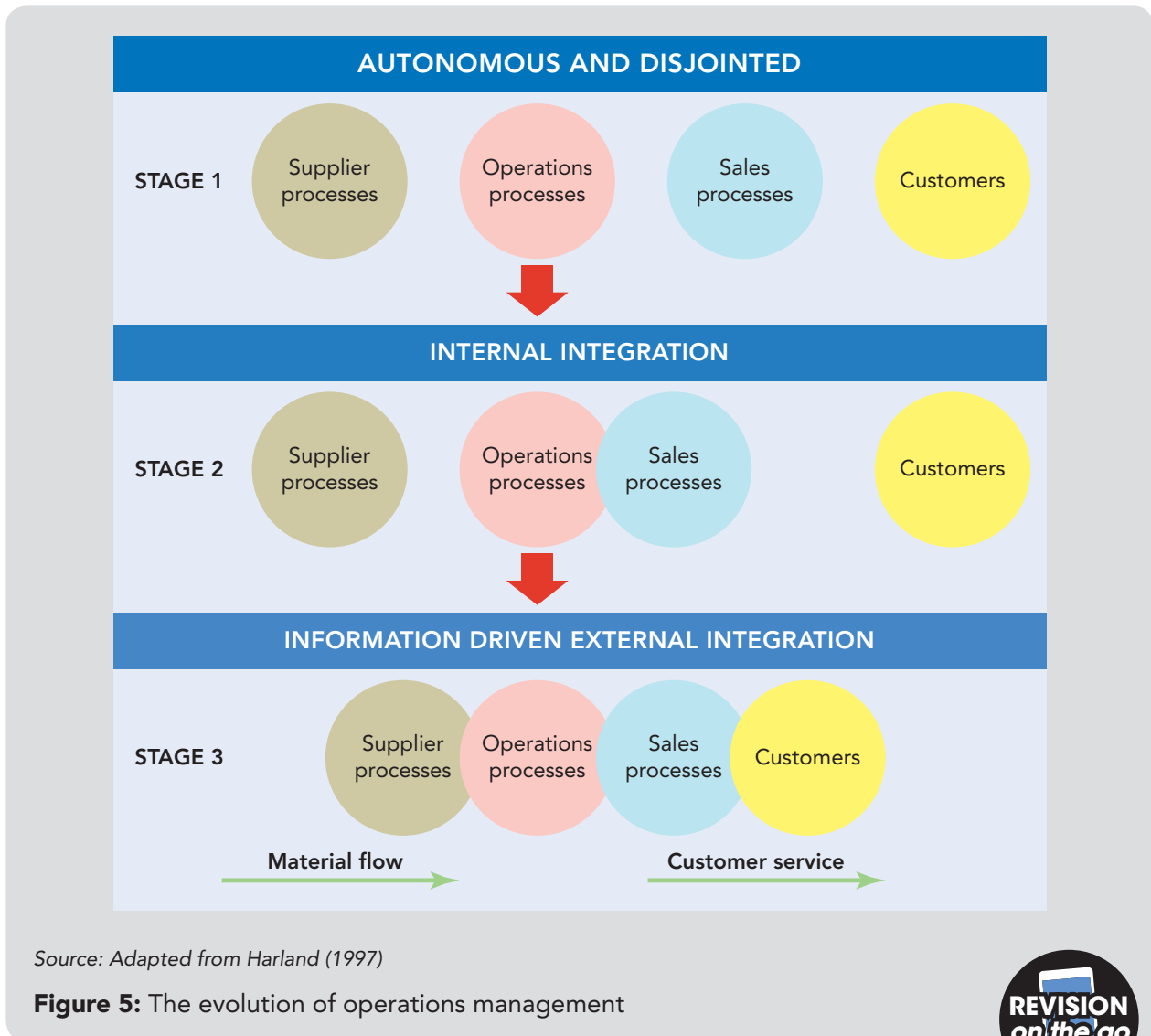
How do you think that airline passengers will react to Ryanair’s new product design which offers slightly more legroom, but no seat-back pockets?

Source: <http://www.telegraph.co.uk/travel/comment/ryanair-new-planes-seat-back-pockets/>

<sup>6</sup> Slack, N., Chambers, S., and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall



Over the past few decades, people's understanding of the role of the operations function has evolved through three stages, described by Harland<sup>7</sup> (see Figure 5).



- Stage 1: Autonomous and disjointed role:

Operations function plays only a supportive role in meeting customers' requirements, and exists only to serve other processes in a neutral, passive manner. In organisations that still adopt this approach, operations is not expected to make a creative contribution towards the organisation's profitability, or display a "competitive drive" (see Stage 1 in Figure 5). The components of the organisation are autonomous and disjointed. This may be an effective approach in monopolies, of which there are few.

- Stage 2: Internal integration:

Operations function is integrated with the organisation's other internal functions. There is coherence between the functions' goals and the organisation's goals. However, suppliers and customers are still treated as distant entities. The organisation's processes maintain "external neutrality" (see Stage 2 in Figure 5). This approach may not be conducive to an organisation's survival and growth if it is in an industry where there is intense rivalry and competition for resources.

<sup>7</sup> Harland, C. (1997), "Supply Chain Management", in Slack, N. (ed.) (1997), *Encyclopedic Dictionary of Operations Management*. Blackwell, p. 210

- Stage 3: Information-driven external integration:

The increase in competition in almost every industry has prompted the transformation of operations in organisations. The organisation that aims to be a market leader treats operations as one of its core functions and strives for “creative and proactive” operations management that is “externally supportive” (see Stage 3 in Figure 5). The organisation expects operations to make a direct and positive contribution to the organisation’s profits. The emerging consensus is that, if managed well, this approach to operations can improve performance far more than it can when other approaches are used. This was illustrated in the simple example of the previous case study.

“Flow measures the quantity of material (measured in input terms such as the number of components, tonnes and litres) that passes through a given network per unit of time.”

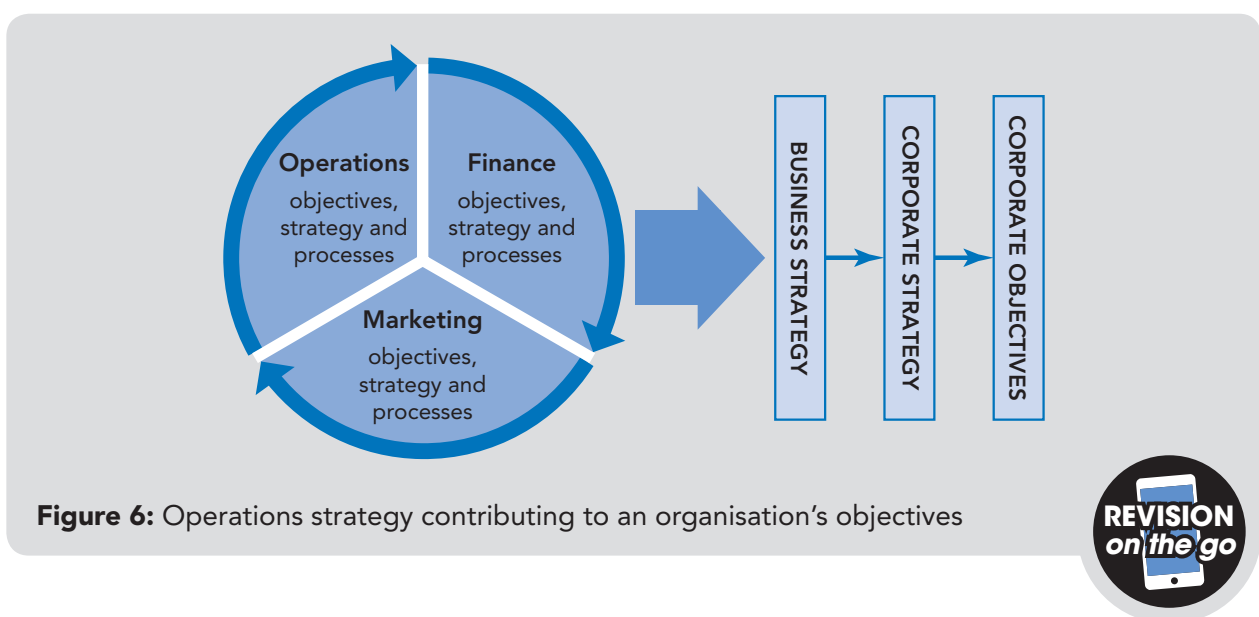
Harrison and van Hoek (2008)<sup>8</sup>

Operations strategy is an integral part of operations management. It is defined as:

“the total pattern of decisions which shape the long-term capabilities of an operation and their contribution to overall strategy. It is the strategic reconciliation of market requirements with operations resources.”

Slack and Lewis (2011)<sup>9</sup>

Through a well-thought-out operations strategy, the focal organisation’s operations is able to use physical resources meaningfully, expand the effective “**capacity**”, and build **core competencies** and **capabilities**. Therefore, operations can be expected to make a direct and positive contribution to reducing costs and the capital employed, increasing revenue, and enhancing innovation. These outcomes build the organisation’s **competitive advantage**. For this to happen, the operations strategy needs to be aligned with the organisation’s **business strategy** and **corporate strategy**, which will in turn help to achieve the **corporate objectives**. The relationship between operations and the organisation’s objectives and strategies is shown in Figure 6 below and Table 5 provides some examples.



**Figure 6:** Operations strategy contributing to an organisation’s objectives



<sup>8</sup> Harrison, A. and van Hoek, R. (2005), *Logistics Management and Strategy: Competing through the supply chain*, 2nd Ed., FT/Prentice Hall, p. 11

<sup>9</sup> Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall

 OVER TO YOU

## Activity 5: Core competencies

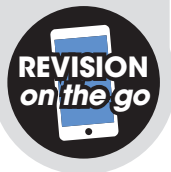
Explain the terms “core competencies” and “capabilities”.  
What core competencies does Honda Motors have?

“Capacity is the quantitative limits of the transformational process. For example, how many burgers, haircuts or clients can be coped with at any given time.”

Lowson (2002)<sup>10</sup>

Organisation's strategy	Operations focus
<b>Cost leadership</b> strategy	Focus on efficiency
<b>Differentiation</b> strategy	Product design
Divestment in manufacturing; replaced with sourcing supplies from low-cost country	Management of the supply chain Strategic <b>procurement</b>

**Table 5:** Examples of the relationship between an organisation's strategy and its operations



According to Lowson<sup>11</sup> an effective operations strategy is the outcome of a detailed analysis of demand and supply on factors such as:

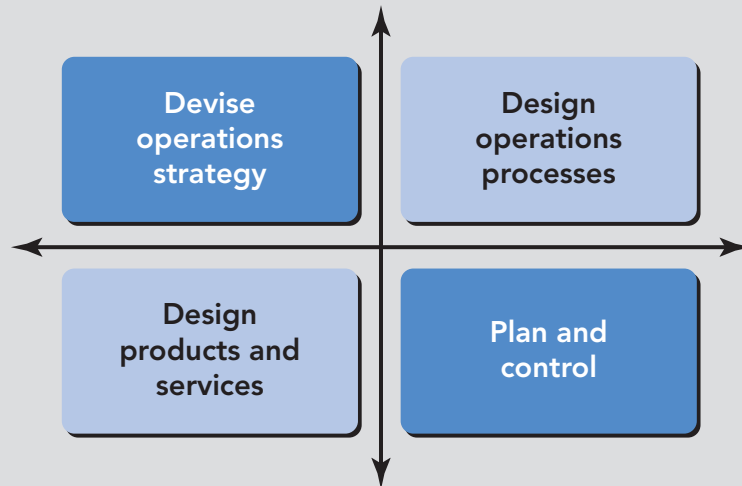
- product attributes (e.g. durability and shelf life);
- demand patterns (e.g. seasonality, changes in fashion, cultural influences);
- customer behaviour (that can influence considerations such as packaging and payment methods);
- Product stream value flows (e.g. the strength, size and financial capabilities of all organisations that make a contribution to meeting the particular market's demand);
- **Vertical integration** (i.e. the current scope of the organisation's operations and expansion possibility).

<sup>10</sup> Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge

<sup>11</sup> *Ibid.* p. 110–111

It is important to understand that the organisation can adopt multiple operations strategies to achieve its business or corporate objectives. However, it does need to make sure that any incompatibility and trade-offs between various operations strategies are not too great.

The activities of the proactive operations function are shown in Figure 7.



Source: Slack, Chambers and Johnston (2010)

**Figure 7:** Activities of operations management



There are two types of tactical decision that shape the operations strategy of an organisation: physical and managerial. The physical decisions that influence operations strategy are set out in Table 6. The managerial decisions (i.e. planning and control) are discussed later in the chapter.

<b>Location</b>	<p>Deciding where to strategically locate a business will depend on the type of business.</p> <p>For example, a retailer will want to be close to a crowded residential area, or in a busy retail area, but a manufacturer will want to be away from residential areas and have easy access to raw materials and transport infrastructure (e.g. a coal-mining company needs to be close to railways).</p>
<b>Capacity</b>	<p>Closely linked to location, capacity refers to the limits on production volume, raw material storage, "component usage", size of workforce, etc.</p> <p>For example, a furniture company's warehouse might have the capacity to store a maximum of 10,000 pieces of flat-pack (self-assembly) furniture.</p>

<b>Facilities</b>	<p>This decision focuses on the number of facilities that are required to serve the market, and the similarities and differences in their operations, based on the markets served and the products or services they produce.</p> <p>For example, a hotel group might operate both a budget hotel and a luxury hotel near the airport.</p>
<b>Flow</b>	<p>This refers to the organisation of operations to handle the volume and variety of products and services for a market segment. Flow strategies can be placed on a spectrum, with “line flow” and “flexible flow” at the two ends of the spectrum, and many other types in between. Organisations can choose one or more flow strategies.</p> <p>For example, a typical automobile assembly line is organised as line flow. A company offering financial advice might have a flexible flow, where people with similar skills or clients sit together.</p>
<b>Process</b>	<p>Decisions about process are closely linked to those about flow. There are broadly five types of processes:</p> <ul style="list-style-type: none"> <li>• project</li> <li>• job</li> <li>• batch</li> <li>• line</li> <li>• continuous</li> </ul> <p>In most operations, the product being created determines the process.</p> <p>Processes differ in terms of flexibility, volume, the number of people required, the degree of customer involvement, and the opportunity for customisation.</p> <p>For example, construction of a factory is a project, while production of bread in a small bakery is a batch process.</p>

Source: Adapted from Lawson (2002)

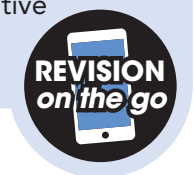
**Table 6:** Physical factors that influence operations strategy

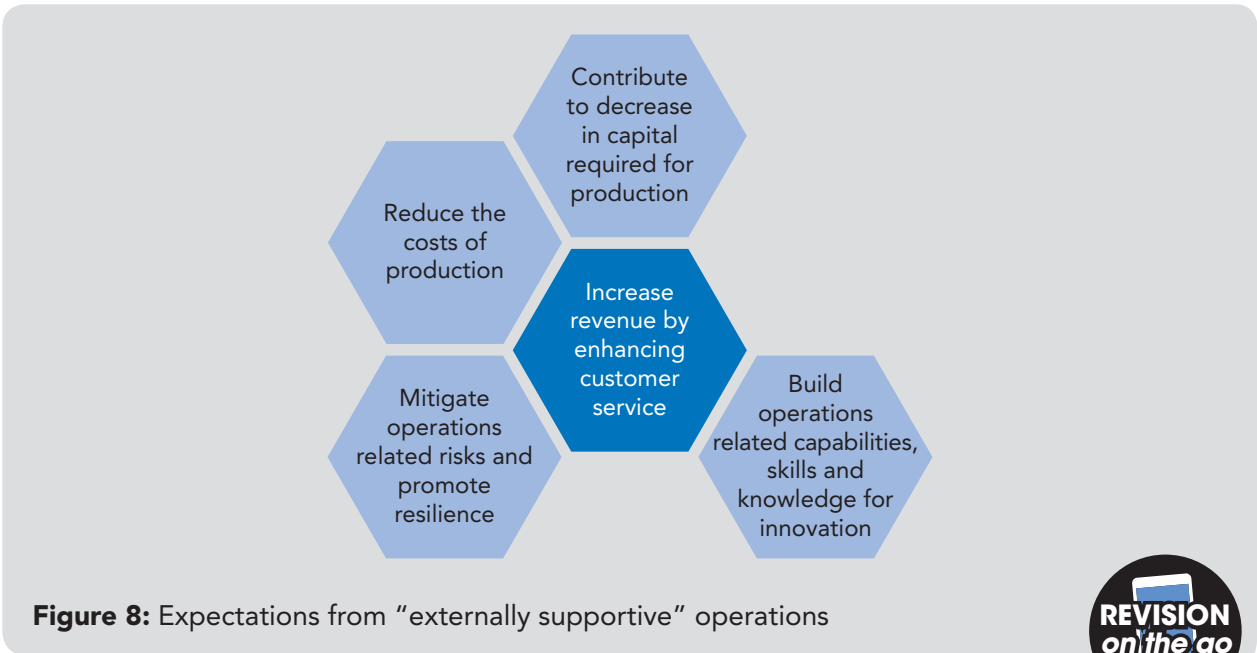


## ! NEED TO KNOW

Operations can create a competitive advantage for an organisation when it is functionally integrated and externally supportive. Operations activities should be planned and carried out with inputs from other organisational functions such as marketing and finance, and should be aligned with other functional strategies.

Effective operations management will include developing an appropriate operations strategy. An operations strategy must be dynamically aligned to the organisation’s “competitive priorities”. The operations function can simultaneously use multiple operations strategies to achieve their business or corporate strategy.





 OVER TO YOU

**Activity 6: Business decisions**

**What decisions might a cash-and-carry (a wholesale warehouse) business make about their location, capacity and facilities?**

## CASE STUDY

### Operations and Profit

A furniture company known for producing high quality wooden beds plans to improve its operating profit\*. The organisation currently sells 2,000 units each year at \$100 per unit. Its current operating expenses are \$100,000.



In an internal meeting, the company's senior managers discuss three possible ways of improving their financial performance.

**Approach 1.** Increase sales volume by 25%. However, this requires advertising, which increases operating expenses by 10%.

**Approach 2.** Increase price per unit by 20%, and support this price rise with a time-definite service commitment, such as "order before noon and get same-day evening delivery". Operating expenses may increase to cover the cost of using more resources to meet the delivery commitment.

**Approach 3.** Improve efficiency to reduce operating expenses by 20%. This approach does not increase expenses or require financial investment.

	Current	Approach 1	Approach 2	Approach 3
Sales revenue	\$200,000	\$240,000	\$220,000	\$200,000
Operating expenses	\$150,000	\$165,000	\$150,000	\$120,000
Operating profit	\$50,000	\$75,000	\$70,000	\$80,000

Source: Adapted from Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management, 6th Ed.*, FT/Prentice Hall

\*Operating profit is gross profit minus operating expenses.

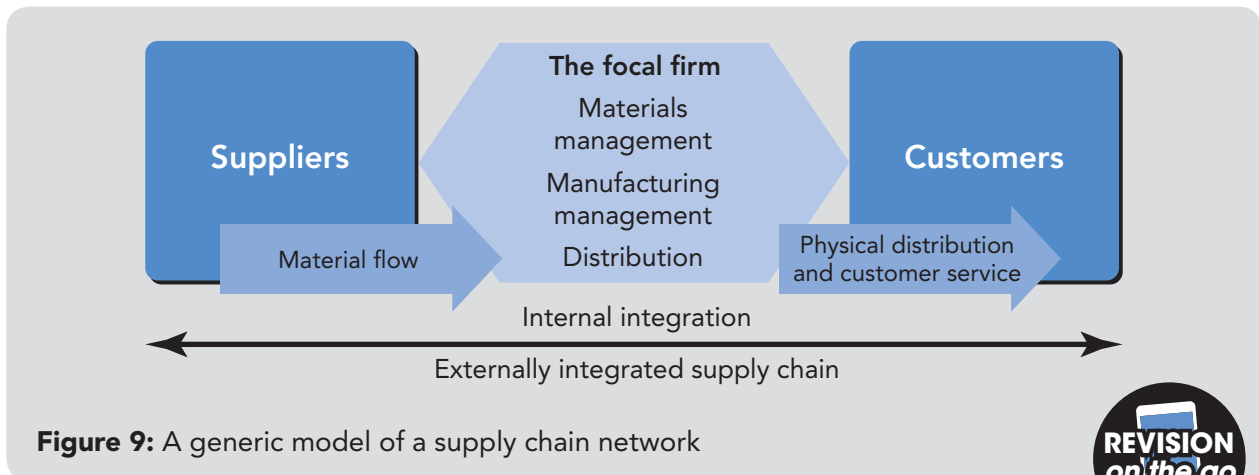
## Operations: a network of processes

Operations that is functionally integrated and externally supportive is a two-way network of processes. At the centre of this network lies the organisation.

- An organisation is made up of multiple functions or units (which might be called departments, business units, divisions, etc.), which are each made up of a collection of processes. Each process has its unique performance objective.
- These processes overlap unit boundaries, spreading from internal operations into the external part of the network, and affecting, or being affected by, the operations of external organisations the organisation has a business relationship with (e.g. direct and indirect suppliers, and distribution intermediaries such as railways). This is called a **supply chain**, or a **supply network** if it is complex. **Electronic data interchange (EDI)** and Internet-based applications have been critical technologies in creating seamless supply networks. The supply network is successful if all the organisations within the network work collaboratively, and all their processes are effective. A generic model of a supply network is shown in Figure 9.
- In some situations, the supply network can embrace the whole industry (e.g. the automobile industry).

“*Electronic Data Interchange (EDI) is the computer-to-computer exchange of structured data between supply chain partners. The key purpose of EDI is to exchange essential information necessary for the effective running of their businesses. For example, transmission of data from a specialty retailer’s electronic point-of-sale (EPOS) system to its key supplier not only facilitates timely replenishment of items sold, but also aids the supplier in demand forecasting.*”

Rushton, Croucher and Baker (2010)<sup>12</sup>



**Figure 9:** A generic model of a supply chain network

REVISION  
on the go

## ! NEED TO KNOW

An organisation’s operations is a network of internal and external processes.

REVISION  
on the go

## Operations performance objectives

### 📄 CASE STUDY: IKEA’S OPERATIONS (A)

#### Cutting food waste by improving employee engagement

IKEA, the global giant in the flat-pack furniture business, also sells food in its store cafeterias in over 400 stores in 48 countries, to more than 600 million visitors to its stores annually. Food is an important and growing part of its business, and its annual sales turnover of food is more than US\$2 billion, which is 5% of the company’s total revenue.

IKEA has embarked on an ambitious mission to reduce food waste through an organisation-wide “food is precious” project. Employee participation, which is an important part of this cost-saving initiative, is achieved by creating a sense of ownership and pride. The results are unfolding in a positive way.

Source: <https://www.greenbiz.com/article/ikeas-7-imperatives-scraping-food-waste>



<sup>12</sup> Rushton, A., Croucher, P. and Baker, P. (2014), *The Handbook of Logistics and Distribution Management*, 5th Ed., Kogan Page, p. 509

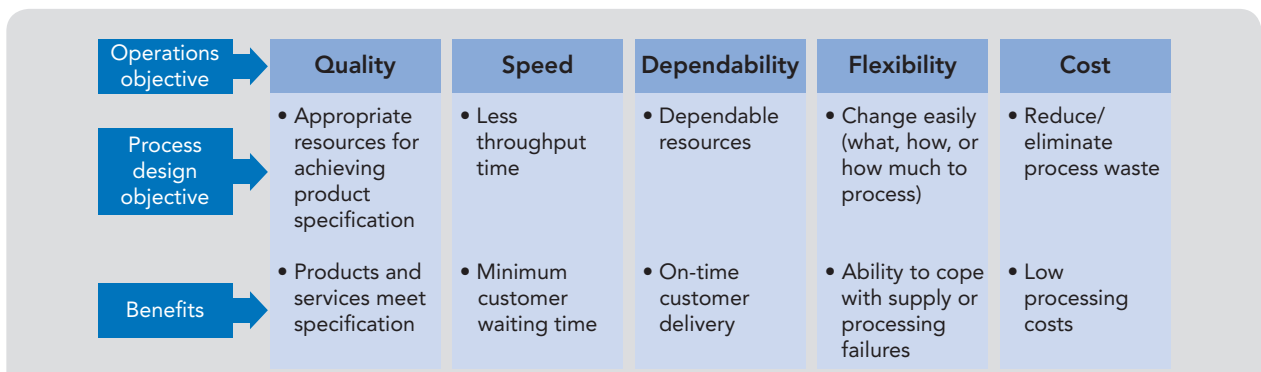
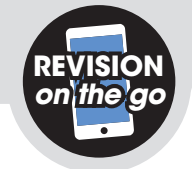


Just like any other function in the organisation, the operations function has explicit and unambiguous objectives that should contribute to the achievement of the organisation’s corporate objectives. Examples of operations performance objectives are shown in Table 7, and the benefits of achieving these objectives are listed in Table 8. The link between process design objectives and operations objectives is shown in Figure 10.

Performance objectives	Example
Quality	To deliver a certain standard expected by customers, including error-free products that do what they are meant to do.
Speed	To have minimum lead-time between the customer’s order and fulfilment of the order.
Dependability	To keep the commitment made to the customer.
Flexibility	To be able to adapt quickly to meet the customer’s requirements.
Cost	To be able to produce products at minimum cost in order to set a winning price.

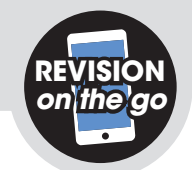
Source: Slack, Chambers, and Johnston (2010)

**Table 7:** Operations’ performance objectives



Source: Adapted from Slack, Chambers, and Johnston (2010)

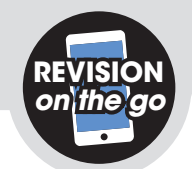
**Figure 10:** The link between operations objectives and process design objectives



Quality	Speed	Dependability
Reduces cost	Reduces inventories	Saves time
Increases dependability	Reduces risks	Saves money
		Gives stability

Source: Adapted from Slack, Chambers and Johnston (2010)

**Table 8:** The benefits of achieving operations objectives

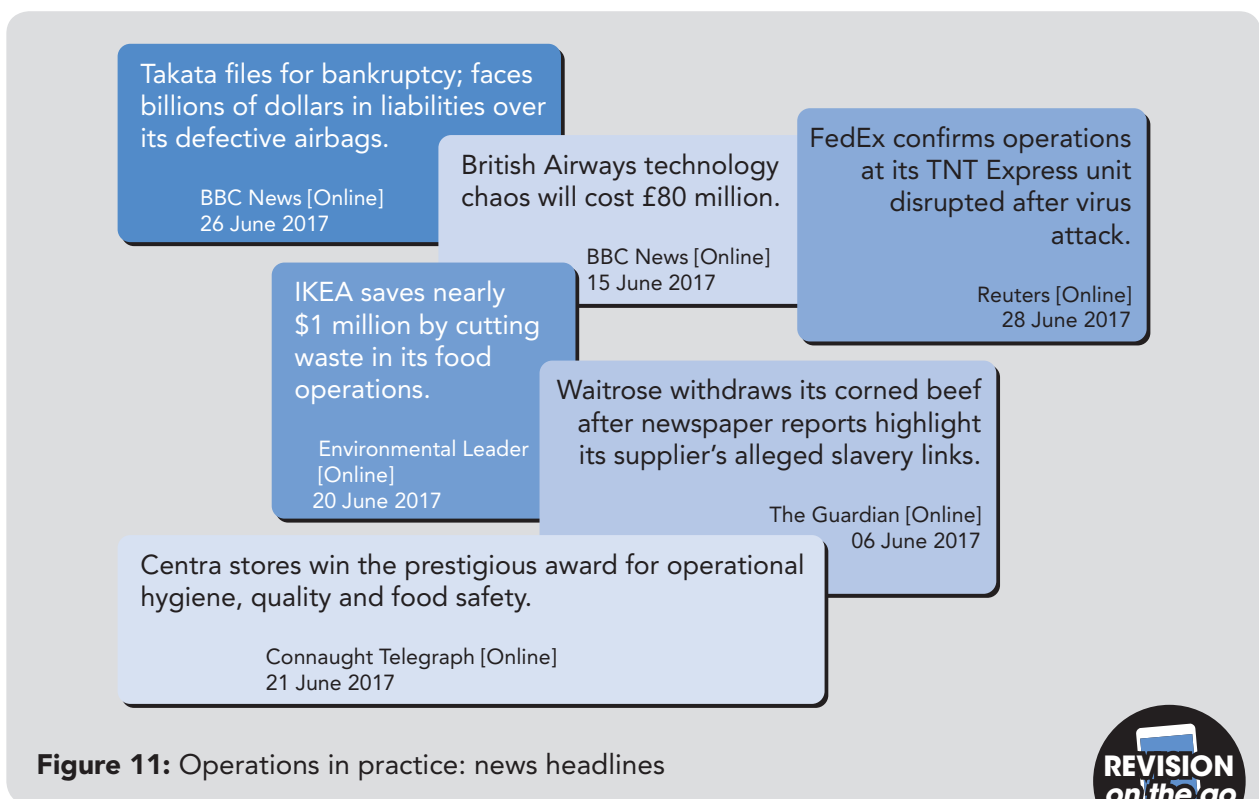


Achieving performance objectives almost always involves trade-offs. For example, an organisation may want to reduce customers' waiting time and keep expenses to a minimum, but to reduce customers' waiting time, they may have to employ more people and therefore increase their expenses.

“Trade-off is a balancing of factors all of which are not attainable at the same time.”

Merriam-Webster Dictionary<sup>13</sup>

When operations objectives are achieved in a well-ordered manner, the organisation gains both tangible and intangible rewards (see the headlines in Figure 11 about IKEA and Centra stores). However, it is not always a trouble-free journey, and organisations often become the victim of external forces or internal failures. If an operations function fails to anticipate risks and make a timely investment in appropriate mitigating actions, it can suffer significant financial and/or reputational loss (see the headlines in Figure 11 about British Airways and Waitrose) or widespread disruption in operations (See the headlines in Figure 11 about TNT Express). If the operations function underestimates the **cost of poor quality**, the consequence can even be bankruptcy (see the headlines in Figure 11 about Takata).



## ! NEED TO KNOW

The five operations objectives are quality, speed, dependability, flexibility and cost.

<sup>13</sup> Merriam-Webster.com (2011), *Trade-off* [online]. Retrieved from: <https://www.merriam-webster.com/dictionary/trade-off> [Accessed on: 7 September 2017]



## OVER TO YOU

**Activity 7: Division differences**

**Ahmed and Joseph run a profitable company that has two distinct divisions. One division is a chain of six fine dining restaurants. The second division is an in-flight catering service that prepares and supplies in-flight meals for multiple airlines.**

**Prepare a table that lists the differences between the two divisions in terms of products, product range and design, customer profile, location, volume, and orientation to quality.**

An organisation operates in an ever-changing environment in which external forces and unexpected internal triggers can create challenges for the operations function and affect its performance. Therefore, an organisation needs to have an explicit, intended operations strategy, as well as a strategy to respond to changes in a timely manner. If it is unable to respond quickly and appropriately, the business may suffer serious consequences.

Strategic analysis – both at the functional and corporate levels – is a necessary managerial activity. The first step in this analysis is to understand the forces at work. These are discussed below. Many of the terms highlighted in this section are covered in separate topics or subtopics in this chapter and later chapters.

**The customer landscape:** This is constantly changing. Customers increasingly expect great variety and high-quality products at competitive prices, and they expect delivery to be fast and reliable. Lowson (2002) describes the nature of emerging consumer demand as “piecemeal, disjointed and unsystematic” that is “becoming increasingly difficult to satisfy”, and states that this is driving the replacement of mass manufacturing with **mass customisation**.<sup>14</sup> For this reason, operations needs to be flexible and responsive. Another trend is the shift of the “conscious consumer” from a **niche** market segment to the mainstream market segment. These customers demand products and services that are environmentally and socially preferable and expect the quality and price to be similar to regular products. To fulfil these requirements, an organisation must adopt **sustainable operations management**. This involves “green” products and process development, “greening” the **supply chain**, creating an **ethical supply chain** and adopting **reverse logistics**.<sup>15</sup>

<sup>14</sup> Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge

<sup>15</sup> Kleindorfer, P., Singhal K., and Van Wassenhove, L.N. (2005), “Sustainable Operations Management”, *Production and Operations Management*, Vol. 14, No. 4, Winter, pp. 482–492

**Competition and rivalry:** This is highly visible: a quick look at any marketplace reveals multiple brands in a large number of product and service categories. Access to modern technology and abundant finance has lowered entry barriers in almost every industry, and, as a result, there is a much greater parity between products. Whether you're comparing mobile phone retailers or coffee shops, the tangible offers are almost identical. Organisations are forced to adopt defensive pricing strategies to deal with intense rivalry, and therefore reduce their profit margin. To achieve better financial results, many organisations strive to attain cost leadership. The organisation that manages to differentiate – due to innovation or other features – and is therefore able to charge a premium price is expected to consistently prove the superiority of its products. Many organisations demonstrate their superiority by embracing **total quality management (TQM)**.

**Flat World: Globalisation** can deliver advantages and disadvantages to an organisation: it can provide opportunities for sales and **global sourcing**, but also brings more competition. More small and medium organisations are selling their products in overseas countries than ever before. Global sourcing is particularly advantageous to Western organisations, which in their search for a low unit cost of goods can get considerable discounts from offshore suppliers due to the **arbitrage opportunity**. The majority of companies report a cost saving of 10–15% by sourcing supplies from low-cost countries.<sup>16</sup> This has a direct impact on an organisation's vertical integration strategy that often relies on outsourcing opportunities. Organisations that aim to sell globally, and procure from global sources, need to recruit and cultivate skills and capabilities so that they can manage a more complex supply network that includes a robust and well planned **logistics strategy** for transportation and warehousing.

**Rise of information and communications technology (ICT):** The twenty-first century has seen an extraordinary increase in the use of ICT, which is constantly influencing and challenging the operations function. Driven by the Internet, **e-business** and **m-business** are growing. These technologies have disrupted a number of conventional business models and brought about a radical change in the operations processes. E-commerce and **e-procurement** are two of the most prolific outcomes of the Internet. E-business infrastructure brings long-term benefits of greater efficiency and effectiveness in buying and selling. According to Slack, Chambers and Johnston, two key advantages of e-commerce are the improved "reach" (ability to offer a larger variety of goods to a larger base of customers) and "richness" (ability to offer greater product information and gain vital information on customers' **purchasing** behaviour) that organisations now have access to. Many organisations are aware of this and are willing to put substantial investment into creating an e-business and e-commerce infrastructure. However, any organisation that uses these Internet-led operations must also plan to mitigate the highly potent risk caused by the threat of cyber-attacks (see the headlines about FedEx and TNT in Figure 11).

**Shareholder expectations: Shareholders** are known for their great appetite for profitability, as it potentially increases **dividends**. In industries that have intense competition, the challenge of meeting shareholder expectations is compounded because the competition reduces the opportunities to increase sales revenue. Instead, these organisations need to aim to source inputs at the lowest possible unit cost. This shifts their primary focus from functions such as marketing and finance, to functions such as purchasing and procurement. The pursuit of cost efficiencies may also change inventory-centric operations, as the organisation decides to shift from traditional manufacturing to **lean manufacturing**. Organisations that take this strategic route often adopt **just-in-time (JIT)** operations.

<sup>16</sup> Slack, N., Chambers, S., and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall, p. 382

There are other stakeholders whose expectations exert pressure on operations. Pressure groups and customers increasingly believe in the notion of **corporate social responsibility**. In recent years, there have been significant legislative initiatives in many countries to hold businesses accountable on matters such as waste disposal and emissions from vehicles. **Green reporting** is mandatory in many western countries, and legislation related to the minimum wage is commonplace in most countries. Organisations operating in a political-legal environment are expected to comply with its unique laws, rules and regulations even if that compliance increases its cost of operations.

**Political turbulence:** This is an uncontrollable force that poses serious risk to operations. War, riots and general political instability disrupt flow of material and finished goods vital for production and distribution.

By understanding these forces, the operations manager can complete **risk management** and adopt strategies that reduce the impact of these forces. For example, understanding that no region is immune to the threat of terrorism allows the operations manager to make an informed decision between **single-sourcing** and **multi-sourcing** strategies.

### ! NEED TO KNOW

There are many environmental and competitive forces that influence operations. An operations manager needs to analyse the environment to identify these forces and their likely impact on operations, and adjust operations accordingly.



““ *The evolution of operations management is inevitable because the nature of competition has changed. This is the “era of inter-network competition” that has transformed competitions from “brand versus brand or store versus store” to “suppliers-brand-store versus suppliers-brand-store”. In other words, it is an era in which two focal organisations within an industry compete on the basis of how well they manage their respective supply chain.* ””

Lambert and Cooper (2000)<sup>17</sup>

To sum it up, the scope of operations has increased. Contemporary operations involves comprehensive supply chain management that includes making decisions about products and processes, purchasing and sourcing (upstream, supply side of operations), physical distribution management (downstream, demand side of operations), materials management, stock (inventory) management and logistics management.<sup>18</sup>

## Planning and control in operations

Planning and control are fundamental tasks in managing all types of business functions.

According to Slack,<sup>19</sup> a plan is a formal articulation of an organisation’s objectives, setting out what it intends to do in order to achieve these objectives. Not all plans are fully implemented, as organisations need to respond to external forces and internal triggers.

“Control” refers to monitoring what actually happens and making appropriate adjustments so that objectives are achieved.

<sup>17</sup> Lambert, D.M, and Cooper, M.C. (2000), “Issues in Supply Chain Management”, *Industrial Marketing Management*, Issue 29, pp. 65–83

<sup>18</sup> Lawson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge

<sup>19</sup> Slack, N. (ed.) (1997), *Encyclopedic Dictionary of Operations Management*. Blackwell, p. 138

“Plan is the intention and control is the driving through of the plan.”

Slack (1997)<sup>20</sup>

The primary aim of operations planning and control is to reconcile the demand from external customers with the supply from internal operations. This is not a straightforward task, and can only be achieved if the four constraints shown in Table 9 are managed well.

<b>Cost restriction</b>	The cost of production cannot exceed a specified amount.
<b>Capacity limitation</b>	The available capacity (e.g. to store materials or finished products) restricts production.
<b>Quality control</b>	The acceptable quality tolerance for products.
<b>Timing constraint</b>	Products must be delivered within a specified time to be of value to customers.

Source: Slack (1997)

**Table 9:** Constraints in operations planning and control



## OVER TO YOU

### Activity 8: Changing the scope of operations in a private hospital

A high-end hospital specialising in cancer treatment has 700 full-time employees and 300 beds. It is a profit-oriented healthcare facility that functions like a business. In addition to surgery, intensive care and outpatient and ambulance services, the hospital's operations also includes a high-quality cafeteria that runs 18 hours a day and has 50 full time employees.

At a recent board of directors' meeting, it was suggested that a team of senior managers should undertake a strategic review of operations with the aim of achieving greater focus and cost efficiency in its operations.

- 1 What are the core operations of the hospital?
- 2 What part of the hospital's operations could be performed by an external organisation?

<sup>20</sup> Slack, N. (ed.) (1997), *Encyclopedic Dictionary of Operations Management*. Blackwell

**OVER TO YOU****Activity 9: Planning and control in operations**

**Mamba's, a fast food restaurant, offers a time-definite home delivery of 30 minutes on its specialty chicken burgers that have a standard price of \$6 and a profit margin of \$1.50 per unit. However, even if delivery takes longer than 30 minutes, they still insist on full payment.**

**Their management analyses the efficiency and effectiveness of its order fulfilment, and find out that 15% of all deliveries take more than 30 minutes.**

- 1 What is your assessment of the time commitment in their operations in financial terms?**
- 2 What will be Mamba's gain in profit if they reduce the percentage of deliveries that do not meet time expectations from 15% to 10%?**

# 1.2 Quality and its management in operations management

## Quality and its role in operations management

### CASE STUDY: TAKATA

#### From parachutes to airbags to market leadership to bankruptcy

Takata Corporation, the Japanese company started by Takezo Takada, started operations in 1933. In its early years, the company was in the business of making parachutes, and in the mid-1960s, it diversified by launching two-point seatbelts. In 1987, it started manufacturing airbags for automobiles and over the decades, Takata became the market leader in this product category.



An automobile airbag is a safety device. It inflates in the event of a collision to safeguard the driver of the car from injury. As Takata's airbags evolved, the company started using a propellant based on ammonium nitrate for airbag inflation. The company suffered its first major setback in 2000 when there was a report of an inflator rupturing. The nature of the rupture was extremely hazardous as passengers were sprayed with pieces of metal.

The incidents of ruptures continued to increase over the next five years. The company's investigation into the cause led to results that were manipulated by its executives. The test data was also kept secret from the public, the US transport authorities, and the automobile manufacturers who were Takata's key customers. As more ruptures were reported and some causing the death of the driver, automobile companies started recalling cars that were fitted with Takata airbags.

Between 2008 and 2014, major companies (including Toyota, Honda, Nissan, Mazda and BMW) recalled more than 10 million cars.

At the end of 2014, the authorities demanded a criminal case to be filed against Takata. The company's shares fell to its lowest in five years. The US National Highway Safety Administration (NHTSA) fined the company heavily for its non-cooperation.

In 2015, Takata made its first public apology after a report came out claiming that there was deliberate negligence on the part of Takata's employees in not disclosing the serious lapse of safety and quality control.

In January 2017, Takata pleaded guilty and paid a fine of US\$1 billion to settle the lawsuit. At least three Takata executives were also criminally charged for concealing vital quality lapses.

In June 2017, Takata filed for bankruptcy in Japan and the US. The company plans to sell its operations to the Chinese company Key Safety for US\$1.6 billion.

Sources: *New York Times*, *Bloomberg*, *Financial Times*



Everyone expects quality, and therefore managers must recognise that by adopting quality management, the organisation is fulfilling its social responsibilities towards “all stakeholders – owners, customers, employees, suppliers, and society”.<sup>21</sup> However, quality is a relative term because there is no general agreement on what quality actually is. According to Slack, Chambers and Johnston,<sup>22</sup> quality can be viewed from two perspectives: the operations’ view and the customers’ view. While the operations’ view leans towards specifications that “consistently conform to customer expectations”, the customers’ view is relatively more complex because it relies more on perception rather than judgement of “the technical specification of the service or product”. Therefore, effective quality management reconciles the two views of quality.

A clear definition of quality makes it easier to measure and manage quality. For this reason, several quality management experts – notably William Deming, Joseph Juran and Philip Crosby – have defined quality, while a number of institutions dedicated to promoting quality management offer their own definitions. These include the International Standards Organisation (ISO) and American Society of Quality (ASQ).

ISO 8402 defines quality as:

“the totality of features and characteristics of a product that bears on the ability to satisfy stated or implied needs [of the customers].”

Lysons (1996)<sup>23</sup>

American Society of Quality (ASQ) offers a similar definition but includes the term “service”. It defines quality as:

“the characteristics of a product or service that bear on its ability to satisfy stated or implied needs [of the customers].”

ASQ (2017)<sup>24</sup>

Another pithy ASQ definition defines quality as:

“a product or service free of deficiencies.”

ASQ (2017)<sup>25</sup>

Lysons analyses the definitions and concludes that the ISO 8402 definition is comprehensive because of the focus on product and customers.

Undoubtedly, a product or service with deficient features cannot satisfy customers’ needs for “economic value as well as safety, reliability, maintainability”. Clearly, the quality issues arising from product features and customer needs are measurable, controllable and therefore manageable.

21 Laszlo, G.P. (1999), “Implementing a quality management program – three Cs of success: commitment, culture, cost”, *The TQM Magazine*, Vol. 11, No. 4, p. 236

22 Slack, N., Chambers, S., and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall, p. 498

23 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing, p. 151

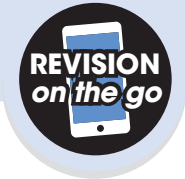
24 American Society of Quality (2017), “Quality Glossary”, ASQ Website [Online]. Retrieved from: <https://asq.org/quality-resources/quality-glossary/> [Accessed on: 9 October 2017]

25 *Ibid.*

**! NEED TO KNOW**

The delivery of quality is viewed as a social responsibility.

There are two perspectives of quality: (1) the operations' perspective and (2) the customers' perspective.

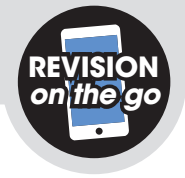


According to Slack and Lewis,<sup>26</sup> quality means "fit-for-purpose". In simple words, it means that the product or service functions in the way that it is expected to. Fit-for-purpose quality is achieved when the organisation's operations meets both of the conditions shown in Table 10.

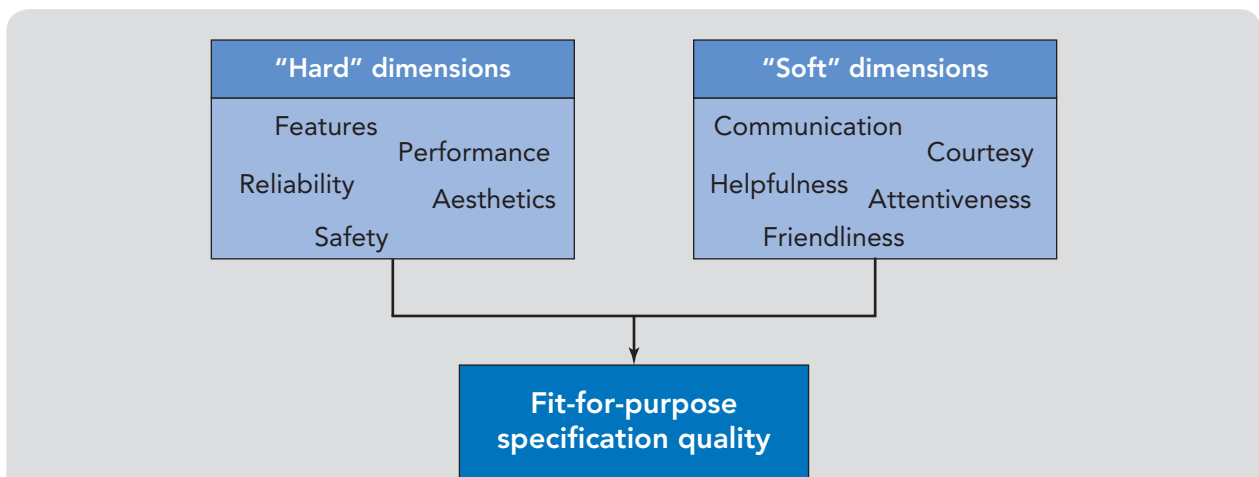
Conformance	Specification
When operations are able to "produce products to their defined specification reliably and consistently".	When the product and service display a combination of hard and soft dimensions necessary for meeting customer requirements.

Source: Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall, p. 48

**Table 10:** Conditions for achieving "fit-for-purpose" quality

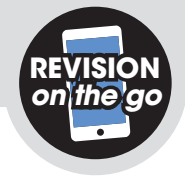


The hard and soft dimensions that can be used to measure quality in terms of specification are shown in Figure 12.



Source: Adapted from Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall, p. 44

**Figure 12:** Hard and soft dimensions of specification quality



Garvin (1987)<sup>27</sup> has a similar idea of quality. He identifies eight independent dimensions of quality. These are shown in Figure 13 and some examples of each dimension are given in Table 11.

<sup>26</sup> Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall, p. 48

<sup>27</sup> Garvin, D.A. (1987), "Competing on the Eight Dimensions of Quality", *Harvard Business Review*, Nov. issue, p. 152



Source: Adapted from Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall, p. 44

**Figure 13:** Eight dimensions of quality

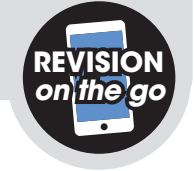


Dimension	Examples
Performance	Sound quality of headphones. Prompt room service in a hotel.
Features	A suite of services offered by a bank – branch banking, online banking, personal loans, business loans, mortgage, insurance products, travel money, etc.
Reliability	Computing devices and their failure rate over a period of time (high frequency of failure indicates poor reliability).
Conformance	An airbag produced for an automobile meets the specification in such a manner that losses from recall, returns, warranties and loss of customers is minimised.
Durability	A low-price non-stick frying pan that lasts for a few years before it rusts and needs to be replaced, compared to one that rusts after a few months, resulting in an early replacement cost.
Serviceability	The breakdown of a rented car and its prompt replacement by the car rental company with the highest degree of soft dimensions (see Figure 12).

Dimension	Examples
Aesthetics	The “look, smell and taste” of a dish ordered in a restaurant. The notion of quality aesthetics may vary from customer to customer.
Perceived quality	The perceived reputation of a brand of mobile phone drives the sales of a new model before there is any evidence of its performance, reliability or durability.

Source: Adapted from Garvin, D.A. (1987), “Competing on the Eight Dimensions of Quality”, *Harvard Business Review*, Nov. issue

**Table 11:** Examples of Garvin’s eight dimensions of quality



## The importance of quality

There are two reasons why quality is an important operations objective:

- quality contributes to superior performance in the marketplace that results in (1) more revenue for the organisation, and (2) the ability of the organisation to obtain higher margins;
- absence of quality burdens the operations with “cost of poor quality” (COPQ).

### ! NEED TO KNOW

There are two attributes of fit-for-purpose quality: (1) conformance, and (2) specification.

Specification quality has hard and soft dimensions.



### OVER TO YOU

#### Activity 10: Quality characteristics

**On a recent shopping trip, you purchased a pair of headphones and a box of chocolates.**

- 1 Explain how these two products differ in terms of quality characteristics.**
- 2 Explain how these quality characteristics are measured.**



American Society for Quality (ASQ) has identified four types of COPQ (see Table 12).

<b>Internal failure costs</b>	Costs that are incurred after the output, but before the products reach the customers. These costs include rectifying defects in the products, and discarding irreparable products.
<b>External failure costs</b>	Costs that are incurred after <b>distribution</b> which include “repairs and servicing, warranty claims, complaints, returns resulting from recalls and rejects.” The low quality is exposed only after the products reach the customers.
<b>Prevention costs</b>	Costs that are incurred before operations, and aim to prevent quality issues. Quality planning is one key prevention cost.
<b>Appraisal costs</b>	Costs that are incurred to ensure that the “purchased materials, processes, products, and services” meet the expected standards. The focus is on quality audits and supplier assessment.

Source: American Society of Quality (2017), “Quality Glossary”, ASQ Website [Online].  
Retrieved from: <https://asq.org/quality-resources/quality-glossary/>

**Table 12:** Costs of poor quality



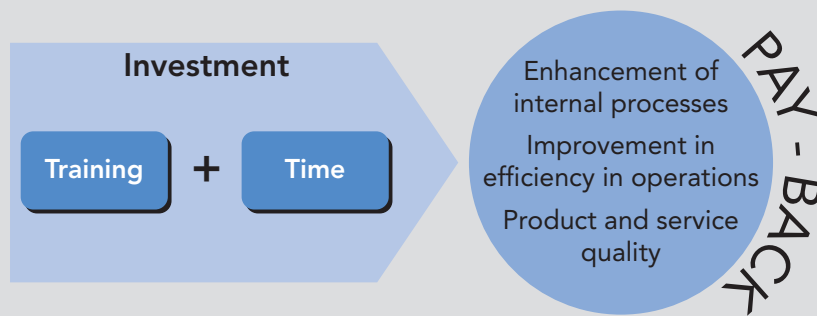
Dale et al.<sup>28</sup> offer research-based quantitative evidence of economic gains and losses associated with quality. Two of these include:

- Economic gain arising from quality:  
The organisation that offers superior quality and service can charge a price premium of up to 10%.
- Economic damage due to lack of quality  
Quality-related problems lead to a 15% – 30% decline in customer loyalty.

When appropriate investment of time and training is made in quality management, the payback is an improvement of internal processes, an increase in efficiency (reduced costs) and an increase in product and service quality (see Figure 14).<sup>29</sup>

<sup>28</sup> Dale, B.G., Bamford, D., and Van der Wiele, T. (2016), *Managing Quality: An Essential Guide and Resource Gateway*, 6th Ed., John Wiley and Sons,

<sup>29</sup> Laszlo, G.P.(1999), “Implementing a quality management program – three Cs of success: commitment, culture, cost”, *The TQM Magazine*, Vol. 11, No. 4, p. 236



Source: Adapted from Laszlo (1999)

**Figure 14:** Investment in and payback from quality management



## ! NEED TO KNOW

Non-conformance of quality leads to higher costs. This is termed as “cost of poor quality” (COPQ).

There are four types of COPQ: (1) internal failure cost; (2) external failure cost; (3) prevention cost and (4) failure cost.



## ✍ OVER TO YOU

### Activity 11: Dimensions of quality

Form two groups in the classroom.

1 Discuss and list examples for each of the eight dimensions of quality for:

- a pair of denim jeans (Group One), and
- a five-star hotel (Group Two)

2 Identify hard and soft dimensions of each example.



## Total quality management (TQM)

Quality has always been central to operations in a business, however, the approach to quality management has evolved over the last few decades, and there is now consensus that quality management should be a proactive rather than reactive process. Total quality management (TQM) views quality as an integral part of an organisation's way of doing things. TQM is defined as:

*“an effective system for integrating the quality development, quality maintenance and quality improvement efforts of the various groups in an organisation so as to enable production and service at the most economical levels which allow for full customer satisfaction.”*

*Feigenbaum in Slack and Lewis (2011)<sup>30</sup>*

*“Getting things right first time.”*

*Slack and Lewis (2011)<sup>31</sup>*

Oakland explains the purpose of TQM as:

- to cultivate a “problem-prevention mentality” in the organisation;
- to use this mentality to enhance the organisation's “competitiveness, effectiveness and flexibility”.<sup>32</sup>

According to Dale<sup>33</sup> TQM is a philosophy rather than an approach. He states that TQM “requires that the principles of quality management should be applied in every branch and at every level in the organisation”. He describes the key principles of TQM as follows:

- Every individual is responsible and accountable for inspection of his/her work, and continuous improvement of the processes associated with his/her role.
- Individuals – employees and suppliers – should cultivate and demonstrate total and on-going commitment to quality improvement.
- Proactive involvement with quality should reduce the flow of defects from one stage to another, in internal and external processes.

<sup>30</sup> Feigenbaum in Slack and Lewis (2011), *Operations Strategy*, p. 84

<sup>31</sup> Slack and Lewis (2011), *Operations Strategy*, p. 86

<sup>32</sup> J.S. Oakland (2003), *TQM: Text with cases*, 3rd Ed., Routledge

<sup>33</sup> B. Dale in N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, p. 166

To appreciate TQM, it is useful to understand the evolution of quality management. This evolution is shown in Figure 15 and explained in Table 13.



Source: Adapted from Dale (1997)

**Figure 15:** Evolution of quality management



<b>Inspection</b>	This is the earliest approach to quality management. It is a simple and straightforward process that focuses on "after-the-event" detection of quality gaps by screening goods, services or activities. It aims to identify products that have deviated from the specifications. Since it is "after-the-event", it is not preventive. The scope of inspection does not extend beyond the organisation's boundaries, and therefore, does not involve suppliers and customers.
<b>Quality control</b>	Control is extended to raw materials and "intermediate product testing" stages. The basic inspection is replaced with a process driven by detailed data and feedback, and carried out with the help of "quality management tools and techniques". Afterwards, any remaining non-conformance is detected by inspection so that defective products do not reach customers.
<b>Quality assurance</b>	This approach focuses on planning and prevention. The focus is on increasing "conformity and uniformity" in products, services and activities by dealing with the "root cause" of non-conformance via a "comprehensive quality management system". There is extensive use of techniques such as <b>Pareto Analysis</b> , and cause and effect analysis.
<b>Total quality management (TQM)</b>	TQM focuses on people rather than processes, emphasising on-going involvement (rather than activity), and quality as a global dimension of operations that extends to suppliers and customers (instead of local, internal, departmental responsibility). The basic premise of TQM is "continuous improvement" and it aims to satisfy internal and external customers.

Source: Dale (1997)

**Table 13:** Evolution of quality management: from inspection to TQM





TQM brings two types of benefits: (1) monetary benefits and (2) work culture benefits. Some examples of each are listed in Table 14.

Monetary benefits	Work culture benefits
Savings arising from decline in rejection and warranty claims.	Quality is evident in every aspect of the organisation's functions.
Savings arising from reduction in the cost of quality.	Employee participation helps to develop an environment of problem identification and problem solving.
Increased <b>customer loyalty</b> creating a sustainable revenue stream.	Individual pride arising from a focus on operational excellence improves employees' commitment to the organisation.

Source: Adapted from Dale in N. Slack (ed.) (1997)

**Table 14:** Benefits of TQM



Slack and Lewis (2011)<sup>34</sup> highlight two criticisms of TQM:

- TQM brings too much “quality bureaucracy” at the cost of spontaneous creativity.
- There is a risk of shifting too much responsibility “down to the shop floor”, leading to a mismatch of expectations and performance.

### ! NEED TO KNOW

Quality management has evolved from basic inspections to total quality management (TQM). Inspection is an activity carried out after production, and is therefore reactive. TQM focuses on creating a culture of quality.



### OVER TO YOU

#### Activity 12: Quality management and organisational commitment

Read the article on Quality Management by George P. Laszlo (1999), “Implementing a quality management program – three Cs of success: commitment, culture, cost”, *The TQM Magazine*, Vol. 11 Issue: 4, pp.231–237. (This article will be available in your online student resources.)

List three ways in which an organisation can commit to quality management.

<sup>34</sup> Slack and Lewis (2011), *Operations Strategy*

## READING LIST

- Christopher, M. (2016), *Logistics and Supply Chain*, 5th Ed., FT Publishing International
- Harrison, A. and van Hoek, R. (2005), *Logistics Management and Strategy: Competing Through the Supply Chain*, 2nd Ed., FT/Prentice Hall
- Laszlo, G.P (1999), "Implementing a quality management program – three Cs of success: commitment, culture, cost", *The TQM Magazine*, Vol. 11 Issue: 4, pp.231–237. (This article will be available in your online student resources.)
- Lawson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, Routledge
- Rushton, A., Croucher, P. and Baker, P. (2017), *The Handbook of Logistics and Distribution Management*, 6th Ed., Kogan Page
- Slack, N. and Lewis, M. (2011), *Operations Strategy*, 3rd Ed., FT/Prentice Hall
- Slack, N., Brandon-Jones, A. and Johnston, R. (2013), *Operations Management*, 7th Ed., Pearson

## Summary

- Operations is an integral part of all types of organisations, regardless of their size, ownership, profit orientation, or products.
- Operations is a set of resources and processes that act to "create and deliver products" that fulfil customers' requirements; and is one of the functions that are the fundamental building blocks of businesses.
- The operations function is responsible for creating and delivering goods and/or services. Meeting customer requirements is the primary aim of operations management, and high performance operations satisfy customers' expectations by incurring minimum costs.
- Operations management is a transformation process, and the key elements of an operations system are transformed resources, transforming resources, and outputs.
- Products and services have different attributes and behaviour that influence operations management and operations strategy.
- Operations function is defined as a collection of processes spread across an organisation's various departments. Over the past few decades, the view on the role of operations function has changed.
- An organisation's performance is driven by the network formed by the internal and external processes. At the core of this network is the organisation.
- When the operations' objectives are achieved in a well-ordered manner, the organisation gains tangible and intangible rewards. However, often organisations become the victim of external forces or internal failures, which can lead to significant financial and/or reputational loss.
- The external environment is constantly changing, and this creates challenges for the operations function. Therefore, organisations need to design operations that are capable of negotiating with these forces in a timely manner. Important external influences include changing customer requirements, competition and rivalry, globalisation, the rise of information and communications technology, challenges of meeting stakeholders' expectations, and political turbulence.
- Planning and control are fundamental tasks in managing of all types of business functions. The primary aim of operations planning and control is to reconcile the demand from external customers with the supply from internal operations.

- Managers must recognise the importance of quality by adopting quality management. This also allows the organisation to fulfil its social responsibilities towards all stakeholders.
- Effective quality management reconciles the operations' view and the customers' view of quality.
- There are hard and soft dimensions of specification quality. Hard dimensions include features, performance, reliability, aesthetics and safety. Soft dimensions include communication, courtesy, helpfulness, attentiveness and friendliness.
- There are two reasons why quality is an important operations objective:
  - quality contributes to superior performance in the marketplace, resulting in more revenue for the organisation and enables the organisation to obtain higher margins
  - absence of quality burdens the operations with cost of poor quality.
- TQM views quality as an integral part of an organisation's way of doing things.
- The purpose of TQM includes:
  - cultivation of a "problem-prevention mentality" in the organisation
  - to use this mentality to enhance the organisation's "competitiveness, effectiveness and flexibility".
- According to Dale, the key principles of TQM are as follows:
  - Every individual is responsible and accountable for inspection of his/her work, and continuous improvement of the processes associated with his/her role.
  - Individuals should cultivate and demonstrate total and on-going commitment to quality improvement.
  - Proactive involvement with quality should reduce the flow of defects from one stage to another in internal and external processes.
- TQM brings two types of benefits: financial benefits and work culture benefits.

# Chapter 2

# Supply Chain and Supply Chain Management

## Introduction

As discussed in Chapter 1, the scope of operations is no longer confined to managing products and materials: modern operations are about management of an organisation's whole supply chain or network.

Competition, globalisation and rapid technological developments are the key triggers in the transformation of the operations function. The premise of operations management driven by the supply chain is that operations cannot afford to be externally neutral (i.e. keep suppliers at arm's length) because an organisation cannot gain a competitive advantage merely on the strength of its brands.

This chapter focuses on the configuration of operations as a supply chain/network, the benefits that an organisation can achieve by adopting the supply chain approach to competing in the marketplace, and the significance of an effective supply chain strategy. Since supply networks are often complex, spread over multiple locations and countries, and involve multiple organisations, they can present many risks. Organisations can identify and manage these risks to mitigate loss, and this chapter discusses various ways to proactively manage risks and improve supply chains.

## Learning outcome

After completing the chapter, you will be able to:

### **2 Discuss the importance of the supply chain and supply chain management**

## Assessment criteria

### **2 Discuss the importance of the supply chain and supply chain management**

- 2.1 Discuss the meaning of an organisation's supply chain
- 2.2 Discuss the role of the supply chain management

# Level 5 Operations Management

## 2.1 The meaning of an organisation's supply chain

### What is the supply chain?

In Chapter 1, we discussed the fact that operations is one of the key business functions. Just like marketing and accounting functions, the operations function has a functional strategy, unique processes, and activities.

If an organisation has a traditional view of operations, primary importance is given to production, marketing and finance, and other functions receive secondary importance.<sup>35</sup> Its functions perform in a disjointed and non-collaborative manner, the scope of the operations function is limited, and senior managers tolerate the "internal and external neutrality" of the operations function. However, if an organisation adopts the supply network strategy, all functions are integrated, and the scope of operations is greatly enhanced. The operations function is not restricted to production and materials management, but also encompasses supplier-relationship management, logistics, physical distribution management, and customer support operations. The operations function becomes "internally and externally supportive", and as a result, the organisation is better able to stay "one step ahead" of the competition.<sup>36</sup>

### CASE STUDY: IN-FLIGHT CATERING

#### Meeting the requirements of fast-paced airline customers

Almost every long haul flight serves meals to its passengers during the flight. In-flight meals are a fundamental part of the service provided by airlines, but the production of food is not an in-house activity. Airlines have almost always relied on external suppliers to provide fresh, good quality and neatly packaged food at the right place at the right time. The huge volume of transactions is evident from the fact that the 40 million passengers a year that fly on British Airways consume more than 35 million meals. In-flight catering is therefore a lucrative industry, but the operations of an in-flight catering organisation are anything but straightforward.



<sup>35</sup> D.R. Ross (1998), *Competing through Supply Chain Management: Creating Market Winning Strategies through Supply Chain Partnerships*, Springer

<sup>36</sup> N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, pp. 125–126

The airline business is highly competitive, and comes with high risk because of the nature of the forces it is subject to, such as security threats and recessions. The profit margin per passenger is low, and therefore, achieving cost efficiencies is a major operations objective. Passengers judge airlines very critically based on the value they offer, and food is an important part of this. Therefore, the quality of food and its timely turnaround are important operations objectives for an in-flight catering organisation.

Food is a perishable item susceptible to high wastage. Each unit has a cost, both for the airline and the in-flight catering supplier, and this cost varies with the class – economy or premium – in which the food is served.

For the suppliers, it is imperative that airlines give them relevant information days in advance (i.e. how many passengers in each class on each flight), but this demand forecasting is not so easy. The in-flight catering organisation in fact gets only a six hours lead-time on the exact number of meals required, and about 30–40 minutes to get the food into the right aircraft before the flight. Operations can also be affected by other external factors, such as security concerns and flight delays.

The supplier's location is therefore critical in this supply chain.

The catering industry is highly competitive, so poor quality food or service can mean the termination of an exclusive contract. Operations objectives in this fast-response service environment can only be met if the supply chain is well integrated, and able to mitigate the risks associated with the industry.

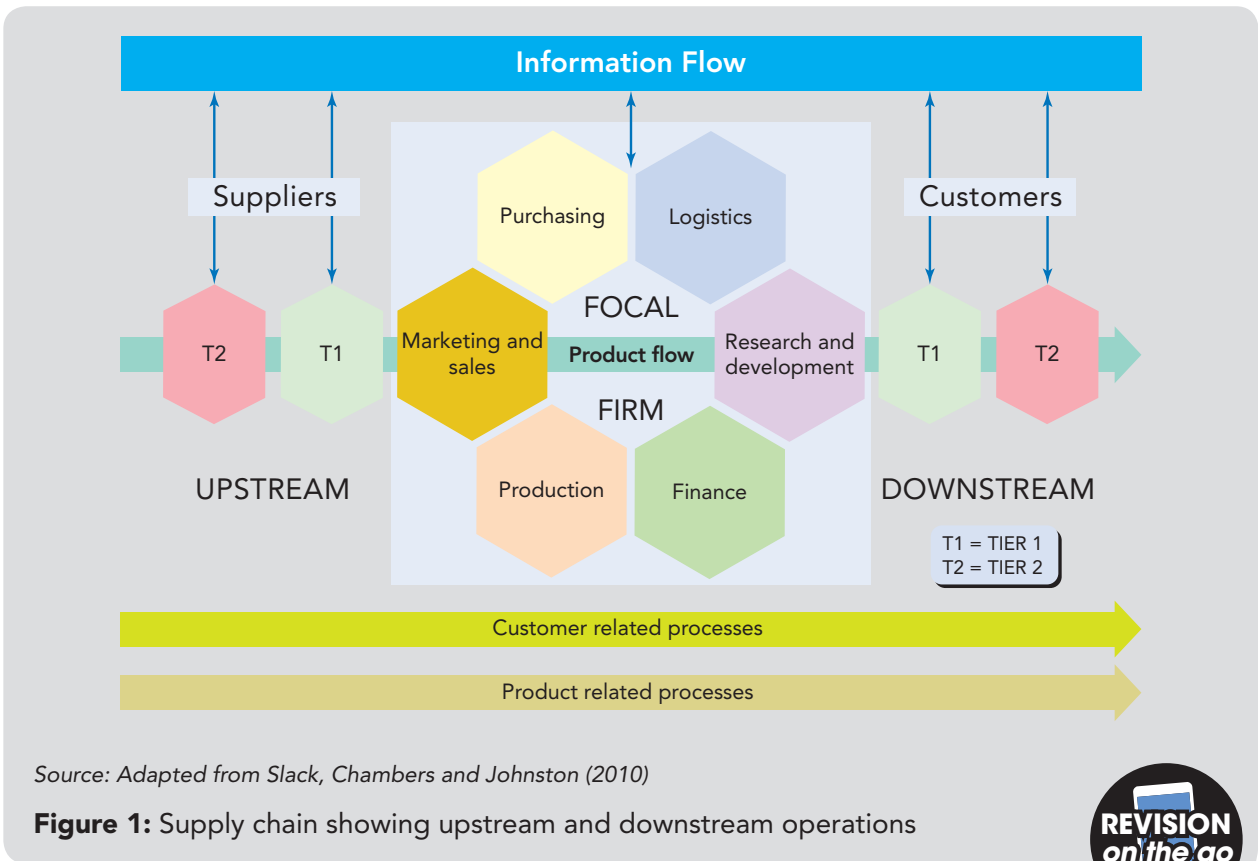
*Source: British Airways corporate website, Adapted from Slack, N., Chambers, S. and Johnston, R. (2010), Operations Management, 6th Ed., FT/Prentice Hall, pp. 387–388*

Slack, Chambers and Johnston<sup>37</sup> state that an organisation's competitive advantage is not just determined by the excellence of some of its operations, but from successful management of the network that spans operations in the organisation as well as **upstream** operations (involving suppliers and suppliers' suppliers), and **downstream** operations (involving customers and customers' customers). Lambert and Cooper<sup>38</sup> argue that in this "era of internetwork competition", organisations need to understand this paradigm shift in operations.

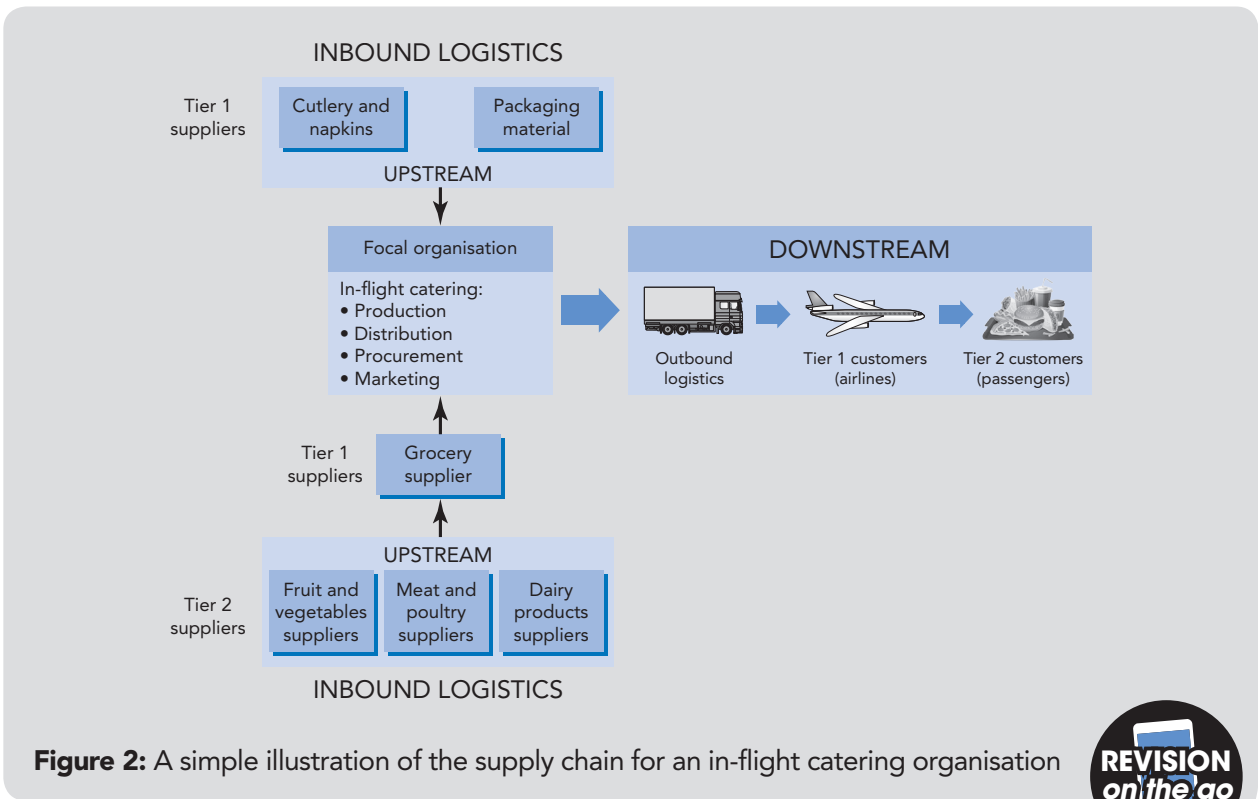
This connection to upstream and downstream operations is termed a supply chain (in its simplest form) and supply network (when the connection includes multiple tiers of organisations). A generic diagram of a supply chain is illustrated in Figure 1. Tier 1 suppliers and customers are closest to the focal organisation, and have a direct connection with it. Tier 2 suppliers and customers have no direct connection with the focal organisation.

<sup>37</sup> Slack, N., Chambers, S. and Johnston, R. (2010), Operations Management, 6th Ed., FT/Prentice Hall, p. 141

<sup>38</sup> D.M. Lambert and M.C. Cooper (2000), "Issues in Supply Chain Management", Industrial Marketing Management, Issue 29, pp. 65–83



The supply chain for an in-flight catering organisation (as described in the previous case study) is shown in Figure 2. The in-flight catering organisation is the focal organisation, which survives and grows by bearing the costs and risk of serving its customers (the airlines).



To understand the “philosophy” of a supply chain, let’s look at its three definitions:

“A supply chain is a group of partners who collectively convert a basic commodity (upstream) into a finished product (downstream) that is valued by end-customers, and who manage returns at each stage.”

Harrison and van Hoek (2005)<sup>39</sup>

“A supply chain is a set of three or more companies directly linked by one or more of the upstream or downstream flows of products, services, finances and information from a source to a customer.”

Mentzer (2000)<sup>40</sup>

“A supply chain is a global network used to deliver products and services from raw materials to end customers in an engineered flow of information, physical distribution and cash.”

Blackstone (2008)<sup>41</sup>

Collectively, these three definitions state the attributes and scope of supply chains. While the first definition does not explicitly include “services” in the scope of supply chain, it highlights the transformative character and the economic motive (“manage returns”) of the supply chain. It also emphasises the importance of delivering **value** to customers. The other two definitions include services, and highlight the flow that occurs in a supply chain.

Mentzer categorises supply chains into three categories, according to their participants, as explained in Table 1.<sup>42</sup>

Category	Participants
Basic	The focal organisation, immediate or Tier 1 suppliers and Tier 1 customers.
Extended	The focal organisation, Tier 1 suppliers and customers, and Tier 2 suppliers (suppliers to Tier 1 suppliers) and second-tier customers (customers of Tier 1 customers).
Ultimate	All organisations – whether immediate or remote – that have any direct or indirect link to the operations of the focal organisation, whether in a significant or limited way.

Source: Mentzer (2000)

**Table 1:** Classification of supply chain



39 Harrison and van Hoek (2005), *Logistics Management and Strategy*, p. 7

40 J.T. Mentzer (2000), *Supply Chain Management*, 1st Ed., Sage Publications, p. 440

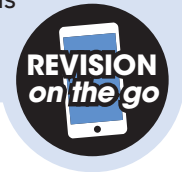
41 J.H. Blackstone (ed) (2008), *APICS Dictionary*, 12th Ed., APICS: Chicago

42 Mentzer (2000), *Supply Chain Management*, p. 440



**! NEED TO KNOW**

The scope of the operations function has grown in the past few decades. Operations involves production, material management, supplier relationship management, logistics, physical distribution management, and customer support operations.



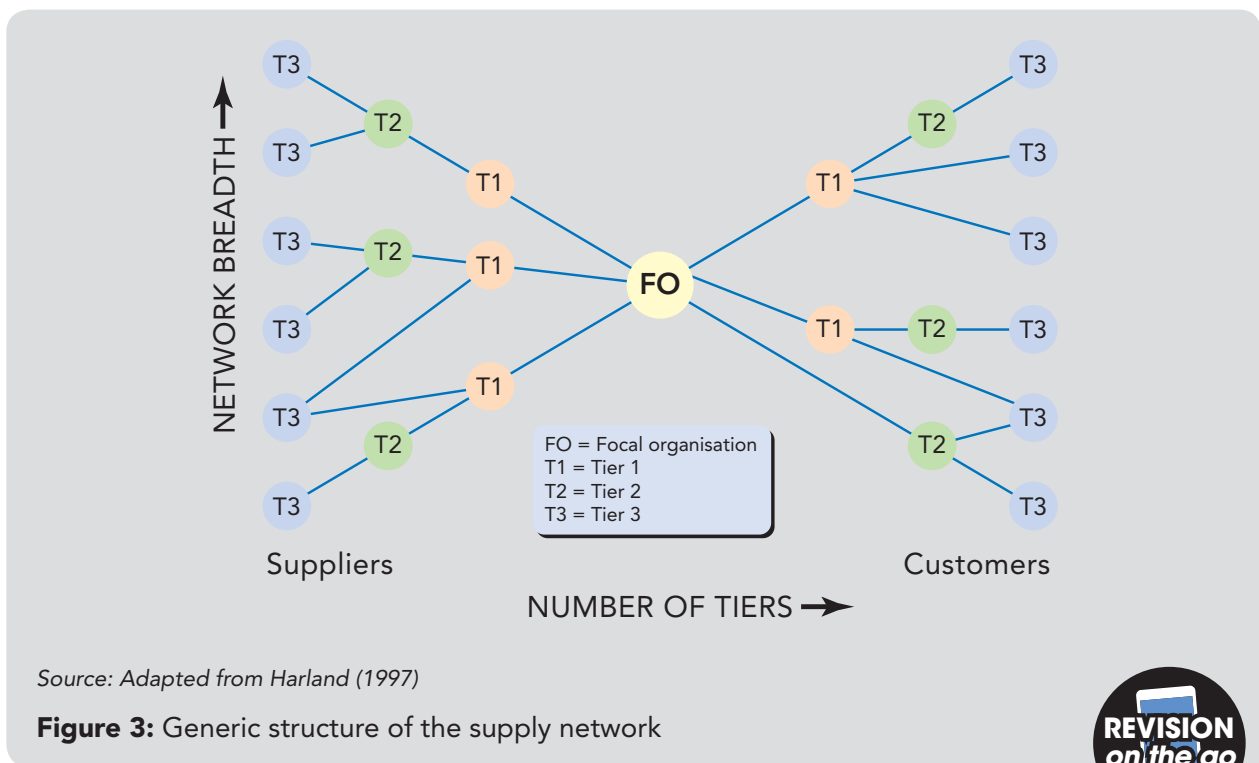
The generic structure of the “ultimate” supply network is shown in Figure 3, which shows that the size and complexity of “externally supportive” operations in the focal organisation is determined by the strategic design of its network structure. Global supply chains are highly complex. This level of complexity can be defined as “an aggregate measure of the structure, type, and volume of interdependent activities, transactions, and processes in the supply chain. It also includes the information, constraints, and uncertainties under which these activities, transactions, and processes take place”<sup>43</sup>

Regardless of the category or complexity of a supply chain, all supply chains share three common properties:

- the focal organisation collaborates with organisations engaged in supply (suppliers) and demand (customers);
- there are upstream and downstream flows of products, services, finances and information;
- multiple processes work together to deliver maximum value.

Supply chain managers who manage a global or “ultimate” supply chain must manage:

- global sourcing through multiple tiers of suppliers, some within the vertical limits of the organisation and others beyond its boundaries;
- multi-locational facilities serviced by complex logistics comprising multiple modes of transport.



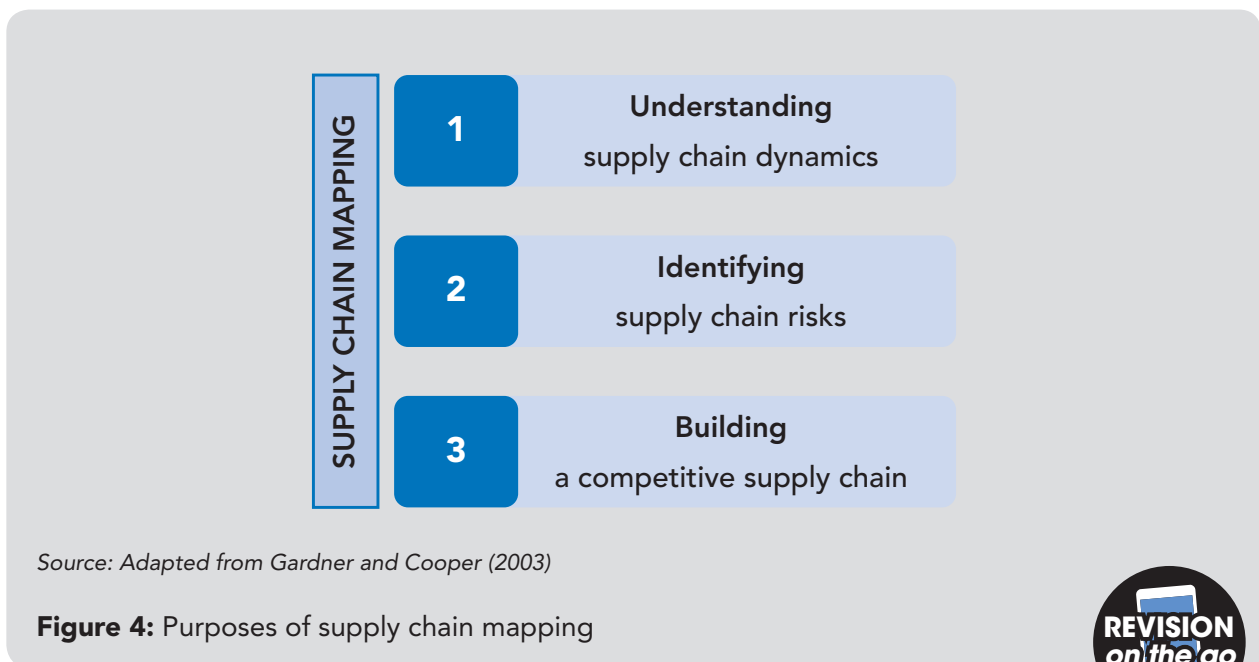
43 I. Manuj and F. Sahin (2005), “Supply chain complexity: defining and managing complexity”, Paper presented at 36th Annual Meeting of the Decision Sciences Institute, San Francisco, November 19–22

## Supply chain mapping

A supply chain map has the same purpose that a Gantt chart or a Critical Path diagram has in project management. As the name suggests, a supply chain map is a visual representation of the supply chain that clearly shows each upstream and downstream “partner” in the supply chain, so that the organisation can assess the risk, costs and the value that each partner adds to the network. Jüttner and Ziegenbein<sup>44</sup> offer a short list of the specific information that can be obtained from a supply chain map:

- type of supplier – sole or single-source, or one of multiple suppliers;
- type of customer – key customer, or not-so-valuable customer;
- type of products or materials bought from a supplier;
- costs of the products or materials bought;
- quantities of products or materials bought;
- replenishment lead-time.

According to Gardner and Cooper,<sup>45</sup> a supply chain map is a strategic tool for an organisation to “clarify supply chain dynamics”, identify supply chain risks, and “build innovative, current, effective supply chains offering sustainable competitive advantages” (see Figure 4).



**Figure 4:** Purposes of supply chain mapping



### ! NEED TO KNOW

Broadly, there are three types of supply chain: (1) basic, (2) extended, and (3) ultimate. The ultimate supply chain is multi-tiered, and therefore most complex and often global.



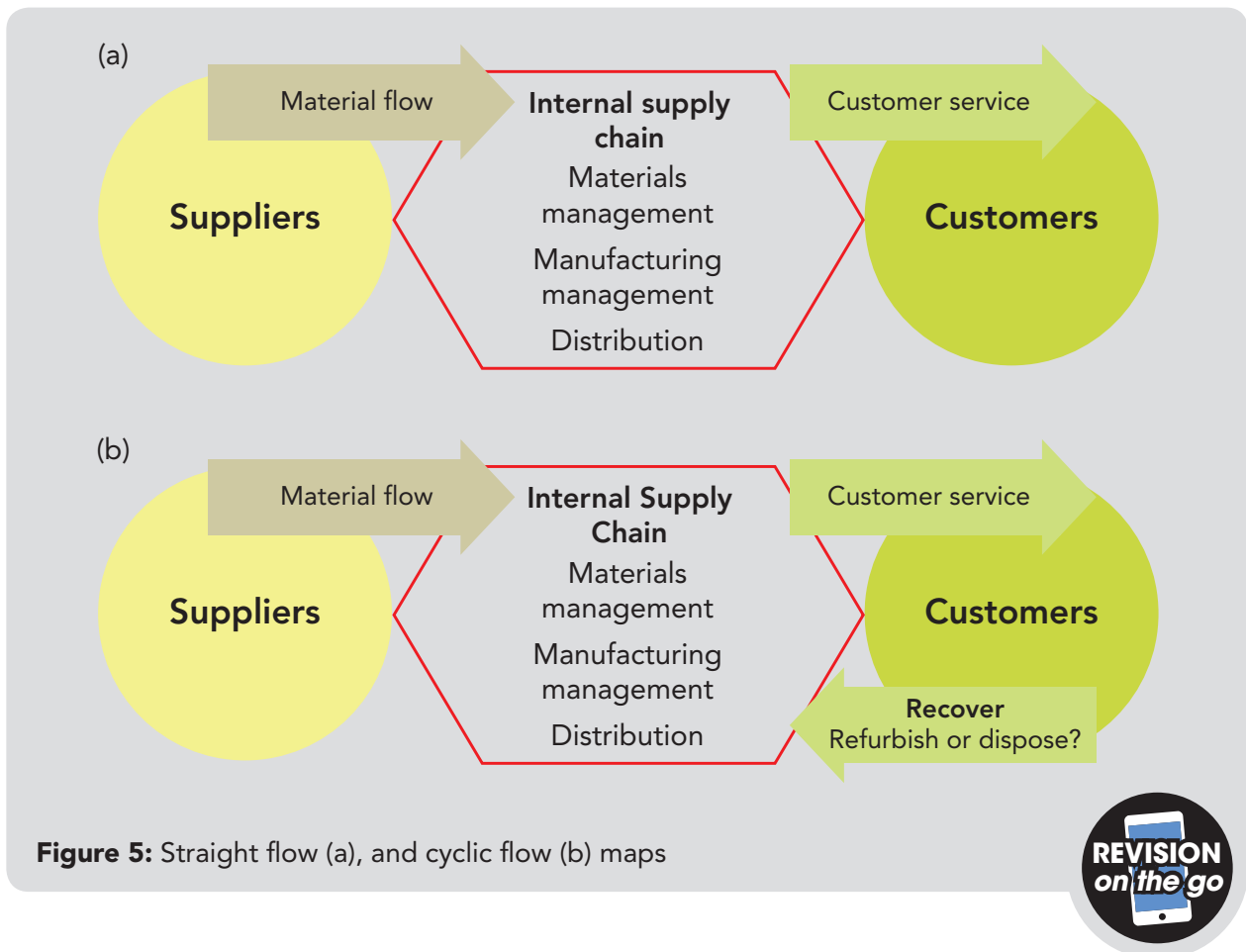
<sup>44</sup> Jüttner, U. and Ziegenbein, A. (2009), *Supply Chain Risk Management for Small and Medium Sized Businesses*, 1st Ed., Springer, p. 212

<sup>45</sup> Gardner, J.T. and Cooper, M.C (2003), “Strategic Supply Chain Mapping Approaches”, *Journal of Business Logistics*, Vol. 24 No. 2, p. 61

Supply chain maps can be classified into two types:<sup>46</sup>

- **straight flow:** indicates the flow of materials from last tier suppliers to end customers;
- **cyclic flow:** this type includes the primary flow of materials and the reverse flow (or reverse logistics) after delivery and consumption, such as “procedures for returns, recalls, and recycling efforts”.

Figure 5 shows a simple illustration of both types of maps.



Gardner and Cooper also provide the following ways of describing a supply chain map:<sup>47</sup>

- An unambiguous picture that shows the links between the corporate strategy and supply chain strategy that provides a greater understanding of the supply chain, and is therefore an important tool to bring together the goals of different departments.
- A mechanism to alert supply chain managers about the “possible constraints in the system”. For example, a supermarket might realise it has multiple meat suppliers but only one supplier of beef, and therefore if that supplier is facing government action for slave labour and may close, the supermarket has no beef supplier.
- A tool to build, monitor and improve the supply chain. For example, the map can help an organisation identify the players/entities that should be a part of the supply chain, decide on the number of tiers that should be managed, and assess the strategic need to redesign the supply chain based on the analysis of “what is” and “what can be”.

<sup>46</sup> *Ibid.* p. 56

<sup>47</sup> *Ibid.*

“Supply chain mapping is used either to help create a supply chain that conforms to a strategy, or as a check to make sure the current chain is set up properly to fulfil that strategy.”

Gardner and Cooper (2003)<sup>48</sup>

“When we talk supply chain mapping, we are really talking about uncovering new opportunities to improve supply chains.”

Media Relations, United Parcel Service<sup>49</sup>

## OVER TO YOU

### Activity 1: Supply chain mapping in real life

According to Achilles, a UK-based company specialising in supply chain mapping, supply chain mapping improves supply chain resilience.

- 1 Access their corporate website via the link below, and watch the three minute video that discusses their supply chain mapping solution.
- 2 List the three key benefits they give of supply chain mapping.

<http://www.achilles.co.uk/en/for-buyers/supply-chain-solutions-portfolio/supply-chain-mapping>

<sup>48</sup> *Ibid.*, p. 46

<sup>49</sup> Media Relations, United Parcel Service [online]. Retrieved from: <http://docplayer.net/10468268-Supply-chain-mapping-customer-solutions.html> [Accessed on: 7 September 2017]

## ! NEED TO KNOW

Supply chain mapping is an instrument of pre-emptive diagnosis. It allows managers to:

- 1 understand supply chain dynamics;
- 2 identify risks in their supply chain;
- 3 build a competitive supply chain.



## Nature of supply chain risks

### 📄 CASE STUDY: IKEA'S OPERATIONS (B)

#### Welfare orientation of their supply chain

IKEA is truly a global company that sells 9,500 products in its 340 stores located in more than 25 countries, and sources products from more than 1200 suppliers in 55 countries. Relatively low cost (i.e. low wage) Asian countries account for 30% of IKEA's purchasing.

IKEA views itself as a "People and Planet Positive" organisation, and at least 70% of IKEA's consumers (in 2015) and 95% of its suppliers (in 2017) perceive IKEA as a socially and environmentally responsible corporation.



The Swedish organisation explains its business idea as heavily driven by cost leadership and price leadership strategies: "to offer a wide range of well-designed, functional home products at prices so low that as many people as possible will be able to afford them."

In its annual report, IKEA also makes a statement about supply chain welfare orientation: "We [IKEA] believe that everyone deserves the right to prosper, regardless of their background and situation. Across our business, from our co-workers to the millions of people who work in our extended supply chain, we can make a difference to people's lives around the world."

Sources: IKEA Sustainability Report (2016). Retrieved from: [http://www.ikea.com/ms/en\\_US/img/ad\\_content/IKEA\\_Group\\_Sustainability\\_Report\\_FY16.pdf](http://www.ikea.com/ms/en_US/img/ad_content/IKEA_Group_Sustainability_Report_FY16.pdf) [Accessed on: 7 September 2017]

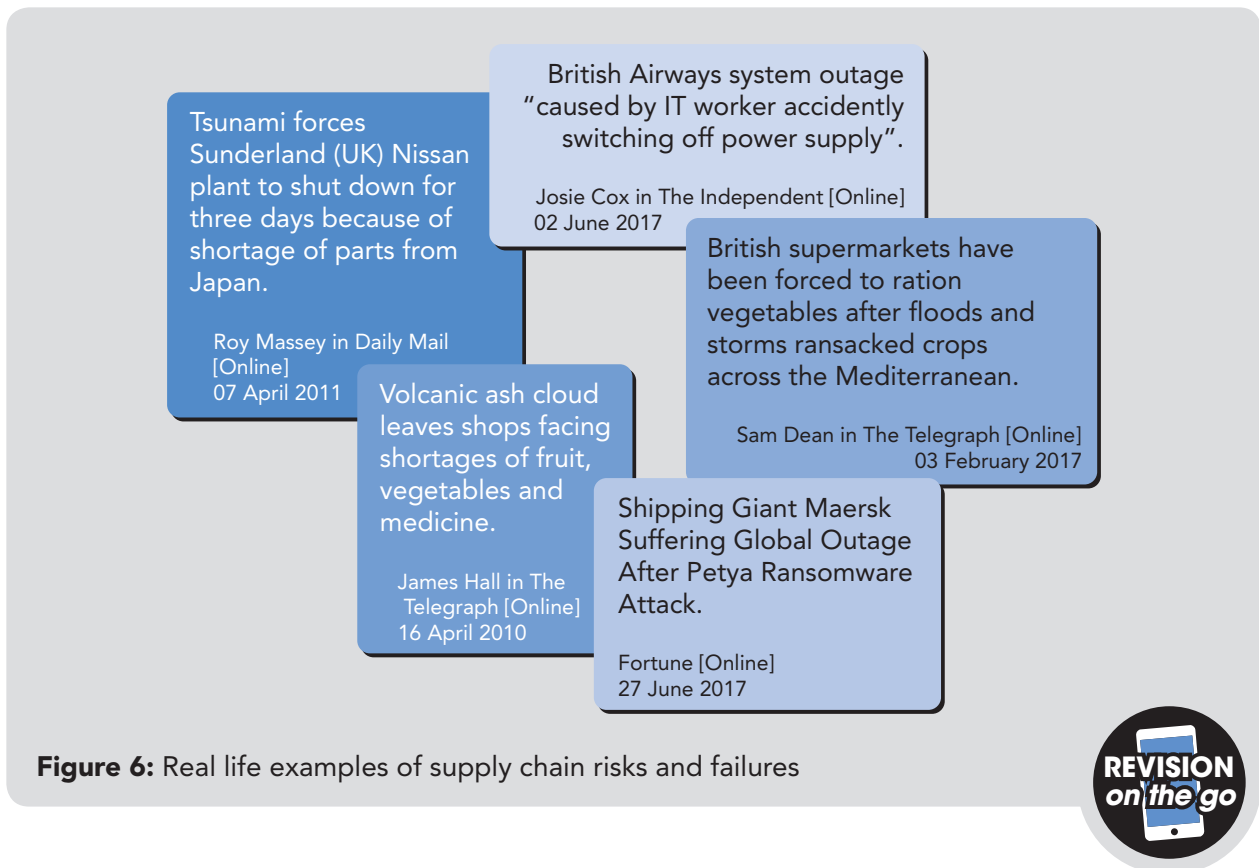
With the breaking of international trade barriers and the proliferation of information and communication technology, there are an ever-increasing number of organisations that have business relationships outside their country of origin. Global sourcing and distribution have become the norm for multinationals, resulting in complex supply chains made up of many culturally diverse suppliers, many of which have unique processes. In addition to sourcing suppliers from different countries, it is commonplace for organisations to also distribute or deliver finished goods to customers worldwide.

“*Risk is the chance that an unexpected event will harm the organisation.*”

Waters (2011)<sup>50</sup>

<sup>50</sup> Waters D. (2011), *Supply Chain Risk Management: Vulnerability and Resilience in Logistics*, 2nd Ed., Kogan Page, p. 35

In these complex networks, raw materials and finished goods physically move through diverse physical structures and political environments, using multiple modes of transport. With this complexity of the supply chain come risks – many of which are posed by events that cannot be foreseen – and which have the potential to disrupt supplies and reduce profits. Some real life examples of risks from newspaper reports are shown in Figure 6.



**Figure 6:** Real life examples of supply chain risks and failures

Risk is a broad term that can be used in many contexts. However, in the context of operations management, risk can be defined as:

Any potential event, threat or failure that disrupts the upstream and downstream flow of material, information and finished goods thereby jeopardising the focal organisation's ability to fulfil the requirements of its end customers, and as a consequence, increasing the possibility of lower-than-anticipated profits.

“*Supply chain risks refer to the possibility and effect of a mismatch between supply and demand.*”

*Jüttner and Christopher (2003)<sup>51</sup>*

“*The magnitude of financial loss due to major supply chain disruption is: Immediate 7–8% decrease in shareholders' return. Up to 7% fall in sales revenue in the year that follows the disruption. Almost 42% decline in operating income and 35% decline in return on assets.*”

*Hendricks and Singhal (2003)<sup>52</sup>*

51 U. Jüttner, H. Peck and M. Christopher (2003), "Supply Chain Risk Management: Outlining an agenda for future research", *International Journal of Logistics: Research & Applications*, Vol. 6, No. 4, 2003, pp. 197–210

52 K.B. Hendricks and V.R. Singhal (2003), "The effect of supply chain glitches on shareholder wealth", *Journal of Operations Management*, Vol. 21, Issue. 5, pp. 501–522

Waters (2011)<sup>53</sup> broadly identifies two categories of risks: internal and external. Table 2 gives examples of each kind.

Internal risks	External risks
Accidents, human error, faults in computer systems, excess stock, poor forecasts, cash shortages.	Industrial action, natural disasters, war and terrorism, epidemics, cyber attacks, inflation, shortage of raw materials, supplier bankruptcy, unethical suppliers.

**Table 2:** Two broad types of risks



Some other experts classify supply chain risk according to four pipelines (or “sub-chains”) of the network.<sup>54</sup> These are explained in Table 3.

Origin of supply chain risk	Comprised of:
Physical sub-chain	Logistics (manufacturing, transportation, warehousing, material handling and processing)
Financial sub-chain	Flow of money (delays in payments can affect or even stop supply, movement, order processing)
Informational sub-chain	Flow of critical information (delays in stock replenishment, movement, order processing)
Relational sub-chain	These are intangible links that are built on “mutual trust and commitment”, discourage “opportunistic behaviour”, and drive managers “to act in the interests of all supply chain members” <sup>55</sup>

Source: Faisal (2009)

**Table 3:** Explanation of supply chain risks according to sub-chains



## Identifying supply chain risks

Chopra and Sodhi<sup>56</sup> (2004) state that there are six types of risks that come from three sources: suppliers, customers, and the focal organisation. Some examples of these risks are presented in Table 4.

53 Waters, D. (2011), *Supply Chain Risk Management: Vulnerability and Resilience in Logistics*, 2nd Ed., Kogan Page

54 Faisal, M. N. (2009), “Prioritisation of Risks in Supply Chains”, in: T. Wu and J. Blackhurst (eds) *Managing Supply Chain Risk and Vulnerability*, London: Springer, p. 47

55 Spekman, R.E., and Davis, E.W. (2004), “Risky business: expanding the discussion on risk and the extended enterprise”, *International Journal of Physical Distribution & Logistics Management*, Vol. 34 Issue: 5, p. 423

56 Chopra, S., and Sodhi, M.S. (2004), “Managing Risk to Avoid Supply-Chain Breakdown”, *MIT Sloan Management Review*, October 2004, Fall Issue

Type of risk	Source		
	Suppliers	Customers	Focal Organisation
<b>Disruptions</b>	A key supplier forced to close factory due to unethical conduct	Sudden surge or decline in demand	Natural disaster shuts down the major manufacturing unit
<b>Delays</b>	Flash floods delay movement of trucks on the highway	Key customer postpones purchase order	Production orders delayed for a week
<b>Systems</b>	Power cuts cause breakdown of supplier's computers	Customer's computer systems break down because of major cyber attack	Human error shuts down computer systems
<b>Information Processing</b>	Ad-hoc increases in order size in quick succession	Sudden change in order pattern disturbs production plan	Sudden change in order quantity disturbs supplier's production plan
<b>Intellectual Property (IP)</b>	Supplier exploits weak local IP law, breaking contract to create own product with focal organisation's IP		
<b>Procurement</b>	Sudden and steep increase in transportation costs		Conflict with key supplier as payment is delayed due to unexpected shortage of cash
<b>Receivables</b>		Delay in receiving a large payment from a customer who purchased on credit	

Source: Adapted from Chopra and Sodhi (2004)

**Table 4:** Classification of supply chain risk according to supply chain entities



## OVER TO YOU

### Activity 2: Customer-related risks

List three ways a focal organisation's operations might be affected by an uncertain delay in receiving a large payment from a customer who purchased on credit.



**OVER TO YOU****Activity 3: Supply chain risks associated with air freight**

**James Hall (2010) reported: "Retailers have increasingly turned to air freight to deliver goods in recent months to counter the soaring costs of sea freight."**

**1 Read his article "Volcanic ash cloud leaves shops facing shortages of fruit, vegetables and medicine" using the link below.**

**<http://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/7599042/Volcanic-ash-cloud-leaves-shops-facing-shortages-of-fruit-vegetables-and-medicine.html>**

**2 List three risks associated with a supply chain that primarily relies on air transportation.**

**3 Write three risks associated with sea freight.**

**4 Which of the two modes of transportation do you think is the less risky?**

 OVER TO YOU

**Activity 4: Supplier related risks**

Refer to the case study: Ikea's Operations (A). Note that there are millions of workers employed with IKEA's suppliers in its multi-tiered supply network.

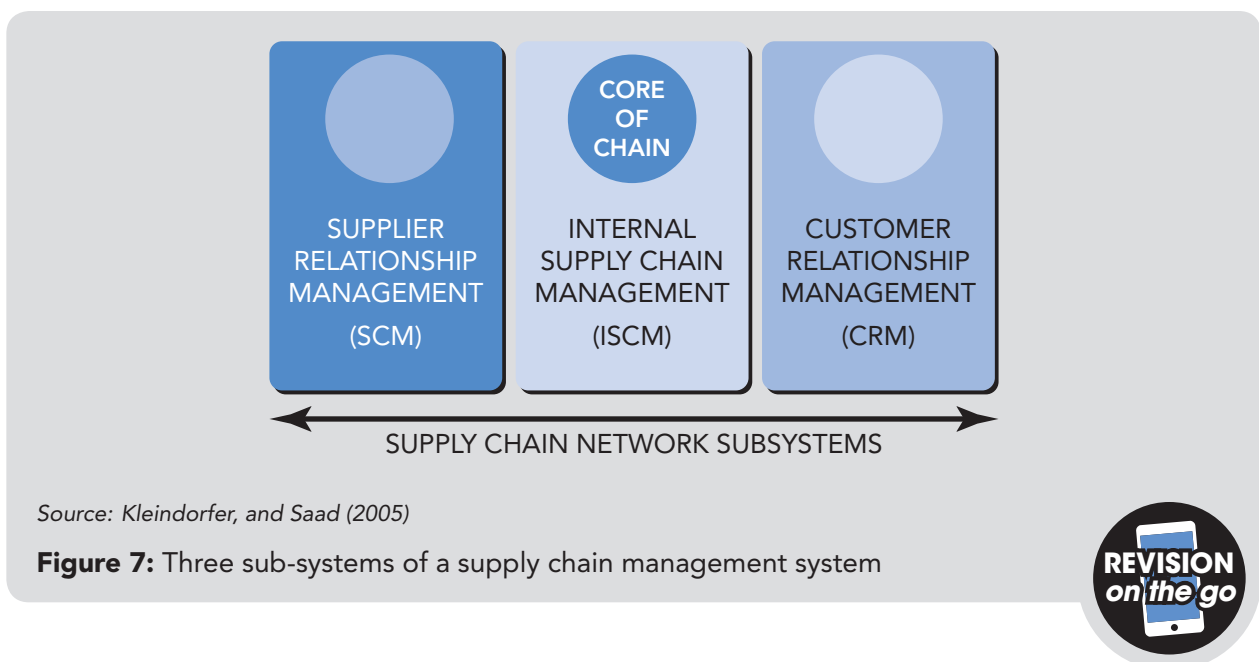
Thinking about the fact that IKEA takes pride in being a socially responsible organisation, write down three supplier-related ethical risks that could affect IKEA's reputation.

## 2.2 The role of supply chain management

### Definition of supply chain management

There are three sub-systems of a supply chain management system (as shown in Figure 7):

- 1 Internal supply chain management (ISCM)
- 2 Supplier relationship management
- 3 Customer relationship management



Source: Kleindorfer, and Saad (2005)

**Figure 7:** Three sub-systems of a supply chain management system



There are several definitions of supply chain management in operations management literature. According to Lambert and Cooper,<sup>57</sup> “supply chain management (SCM) is a new way of managing the business and its relationships”. Christopher defines it as:

“*The management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.*”

Christopher (2004)<sup>58</sup>

Chopra and Meindl support this definition of supply chain management. They use the term “supply chain surplus” to describe the notion of value.<sup>59</sup> They suggest that while some part of this value is enjoyed by the customer, the rest is “supply chain profitability”. They express supply chain surplus in a simple equation:

“*Supply Chain Surplus = Customer Value – Supply Chain Cost*”

According to Harland,<sup>60</sup> the notion of supply chain management has evolved from traditional operations in which the management of the supply chain was viewed as management of the “internal supply chain” comprising functions such as purchasing, materials control, production, sales and distribution.

The Council of Supply Chain Management Professionals (CSCMP) offers a very comprehensive definition:

“*Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes co-ordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.*”

CSCMP (2008) in Crandall, Crandall and Chen (2015)<sup>61</sup>

Houlihan suggests that the network perspective makes supply chain management more strategic than classical operations management because it takes a **systems view** of operations in which “supply becomes a shared objective of every function”, and “integration” of fragmented functions replaces “interfacing” between functions.<sup>62</sup> This shift in approach has a direct and positive “impact on overall costs and market share.”

57 Lambert, D.M. and Cooper, M.C. (2000), “Issues in Supply Chain Management”, *Industrial Marketing Management*, Issue 29, p. 66

58 Christopher, M. (2004), *Logistics and Supply Chain Management: Creating Value – Adding Networks*, 3rd Ed., Financial Times / Prentice Hall, p. 5

59 Chopra, S., and Meindl, P. (2015), *Supply Chain Management: Strategy, Planning and Operation*, 6th Ed., Global Edition, Pearson, p. 15

60 Slack, N. (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, p. 210

61 Crandall, R.E., Crandall, W.R. and Chen, C.C. (2015), *Principles of Supply Chain Management*, 2nd Ed., CRC Press, p. 6

62 Houlihan, J.B. (1988), “International Supply Chain Networks: A New Approach”, *Management Decision*, Vol. 26, No. 3, p. 13

Harland gives the following two key advantages of managing networks:<sup>63</sup>

- Networks offer both economies of scale and economies of scope in activities. For example, the opportunity to save costs from large-scale production, and/or from managerial activity that spans multiple products, multiple markets and geographical regions (explained later).
- Networks enable the organisation to overcome the constraints caused by limited in-house resources and capabilities, by offering the opportunity to achieve productivity and economic gains from other businesses' resources.



## OVER TO YOU

### Activity 5: Managing supply networks

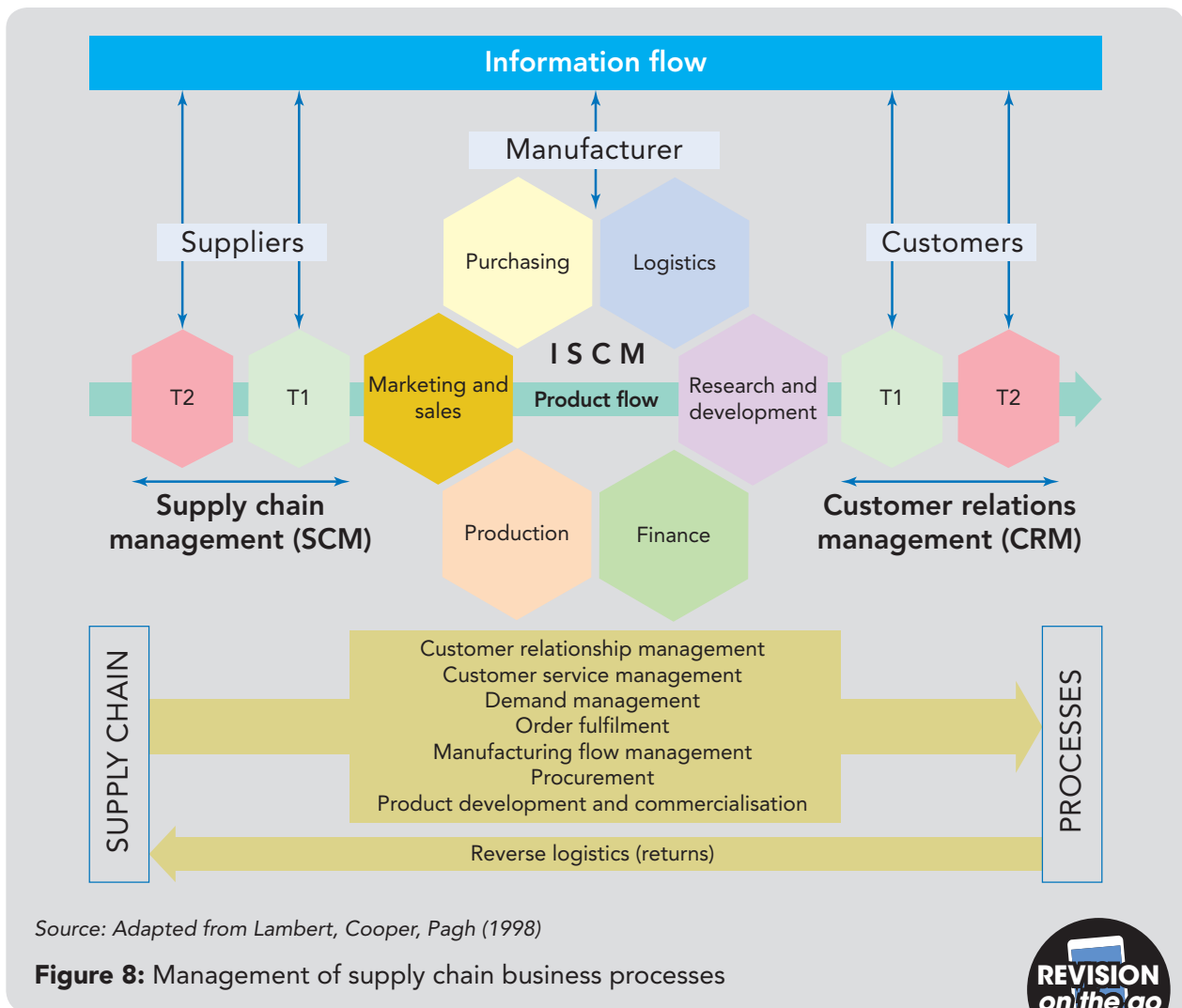
- 1 Read the article "Shining Examples" (The Economist, June 2006) at: <http://www.economist.com/node/7032179>**
- 2 Prepare and deliver a two-minute presentation to the class about Zara's approach to supply chain management.**

According to Mentzer,<sup>64</sup> because the "philosophy" of supply network management permeates operational entities on both the supply and demand sides, it creates a complete channel that unifies "intraorganisation and interorganisation operational and strategic capabilities" and transforms it into a "compelling marketplace force."

<sup>63</sup> C. Harland in N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*

<sup>64</sup> J.T. Mentzer (2000), *Supply Chain Management*, p. 9

Lambert, Cooper and Pagh<sup>65</sup> suggest supply chain business processes must be managed to create an “outcome driven supply chain.” Their model is shown in Figure 8.



Source: Adapted from Lambert, Cooper, Pagh (1998)

**Figure 8:** Management of supply chain business processes

## ! NEED TO KNOW

Supply chain networks offer the following two advantages.

- 1 Economies of scale and economies of scope in activities.
- 2 Organisations can overcome the constraints imposed by limited in-house resources and capabilities.



## Managing supply chain risks

Supply chain risks can cause failure in operations. Two of the basic causes of failure are that goods and services are either not delivered on time, or do not meet quality standards.<sup>66</sup>

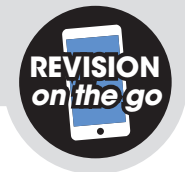
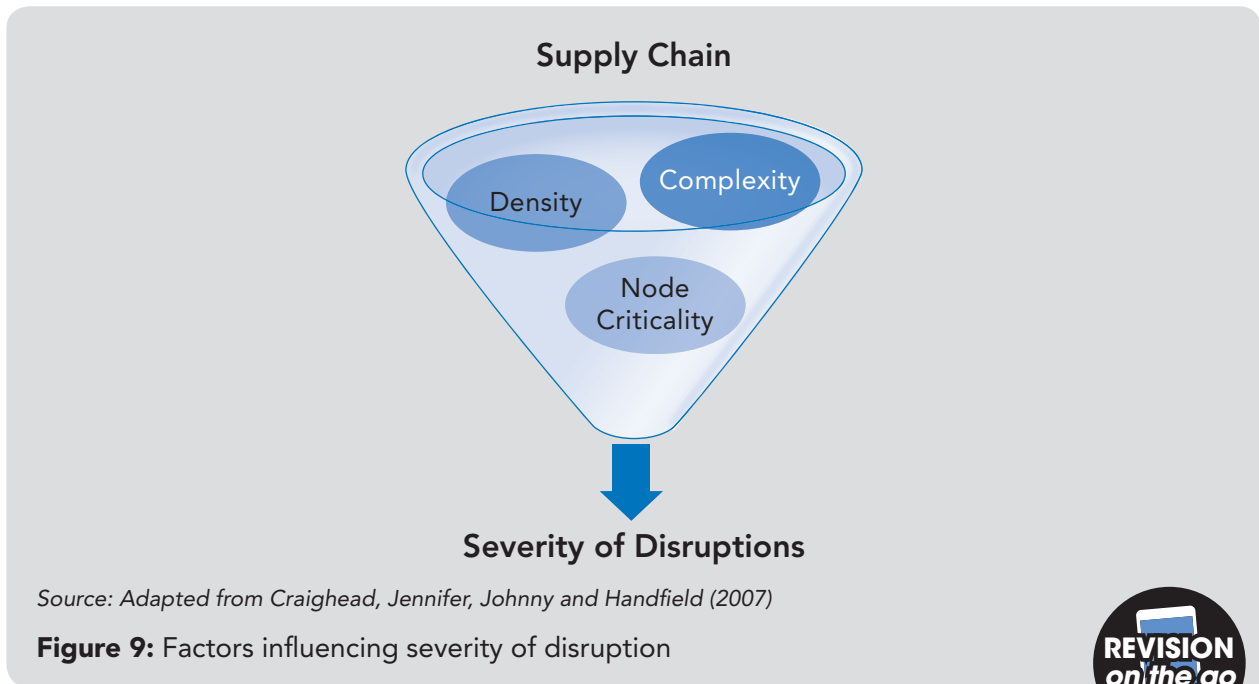
Supply chain risk management (SCRM) is an integral part of supply chain management. SCRM

65 D.M. Lambert, M.C. Cooper, J.D. Pagh (1998), “Supply Chain Management: Implementation Issues and Research Opportunities”, *The International Journal of Logistics Management*, Vol. 9 Issue: 2, p. 2

66 Slack, Chambers and Johnston (2010), *Operations Management*, p. 574

requires a comprehensive strategy that is created by taking a top-down identification and mapping approach, and a bottom-up “**emergent**” approach.<sup>82</sup>

According to Craighead et al.,<sup>67</sup> there are three supply chain attributes that contribute to enhance the severity of disruption in operations: density, complexity, and **node** criticality (see Figure 9). However, if the supply chain is designed to facilitate the quick flow of information in the aftermath of the event, the loss from disruption can be reduced. This is one aspect of risk management that decreases the probability of disruption and mitigates the threat to profitability.

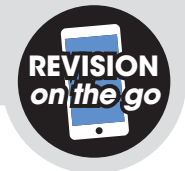


Kleindorfer and Saad<sup>68</sup> offer the SAM framework of supply chain risk management. SAM is an acronym for “specifying sources of risk and vulnerabilities, assessment and mitigation”. Specific elements of the “S” (specifying sources of risk and vulnerabilities) are listed in Table 5 and the ten principles of “assessment and mitigation” are explained in Table 6.

Specifying sources of risk and vulnerabilities		
Operational contingencies	Natural hazards (e.g. earthquakes, hurricanes and storms)	Terrorism and political instability

*Source: Kleindorfer and Saad (2005)*

**Table 5:** Three elements of “specifying sources of risk and vulnerabilities”



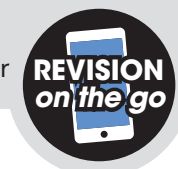
<sup>67</sup> C.W. Craighead, B.M. Jennifer, R. Johnny and R.B. Handfield (2007), “The severity of supply chain disruptions: Design characteristics and mitigation capabilities”, *Decision Sciences* 38(1) pp. 131–156  
<sup>68</sup> Kleindorfer, P.R. and Saad, G.H. (2005), “Managing Disruption Risks in Supply Chains”, *Production and Operations Management*, 14(1), pp. 55–57

The ten principles of the SAM framework are:

The SAM Framework	
Principles	Explanation
ISCM integration precedes external supportiveness	Involvement of senior management; systemic identification and mitigation of internal disruption risks.
Portfolio diversification	Spreads risks across facilities, locations, products, sources of supply, and processes.
Provide "incentive alignment and collaboration" to mitigate risks among all supply partners "through early warning and crisis management systems"	Based on the premise that "one weak partner" can be disastrous for the entire supply network. Stage "risks and failures" and test the entire network through rehearsal.
Risk avoidance should precede risk reduction	Investment is essential to determine how "key vulnerabilities" can lead to "worst case scenarios". These scenarios are mapped with mitigation strategies in order of preference.
Decide on appropriate trade-off between expected reliability of supply chain in the event of disruption and its normal "overall efficiency"	Trade-off is essential to reduce the incidents of disruptions that are costly because of an unbalanced approach.
Take traditional steps to build a robust network and improve processes	Create physical and virtual back-up systems.
Cultivate three Cs (co-operation, co-ordination, and collaboration), internally across all functions, and externally across the entire supply network	Very useful in identifying weak links. Can be adopted across industries for mitigating universal risks such as "terrorism and security".
Quantify risks to avoid a "general sense of alarm in the organisation and the supply chain"	Important for "cost-effective" mitigation strategies.
Develop responsiveness to disruptions through "flexibility and mobility of resources"	Supply chain resilience should be an important area of focus when supply network is being designed.
Adopt Total Quality Management and Six Sigma tools. Implementation possible with "information coding systems and the use of RFID (radio frequency identification) technology"	This "enhances supply chain security" and "reduces operating costs".

Source: Kleindorfer and Saad (2005)

**Table 6:** The ten principles of the SAM framework for supply chain risk management



“ One weak partner in the supply chain can prove disastrous for all participants, especially when purposeful agents analyse rationally where to target their disruptive attacks. ”

*Kleindorfer and Saad (2005)<sup>69</sup>*

Chopra and Sodhi<sup>70</sup> suggest that SCRM strategy requires a two-pronged approach and corresponding techniques (see Table 7).

Approach	Implies	Technique
Shared understanding	Making the whole organisation aware of the supply chain risks	Stress testing
Fine-tuning risk mitigation	Adapting risk mitigation approaches relevant to the focal organisation	Tailoring

**Table 7:** Chopra and Sodhi's two-pronged approach to SCRM



### Stress testing

This is a “what-if” technique that involves three steps.

- 1 Identify “key suppliers, customers, plant capacity, distribution centres and shipping lanes”.
- 2 Survey “locations and amounts of inventory represented by components, work-in-process, and finished goods”.
- 3 Probe “each potential source of risk” to understand how prepared the focal organisation is.

The third step anticipates and assesses the “level of pre-preparedness” by using basic, realistic “what-if” questions that explore the impact on operations. Examples could include:

- What if Supplier A’s plant breaks down for a month?
- What if it takes six months to find a replacement for Supplier A?
- What if Supplier B increases their prices by 25% when the contract is renewed?
- What if there is an earthquake in Location X?
- What if Supplier C steals the product patent and launches its own brand?
- What if one of the key IT servers at the data centre shuts down unexpectedly?

One of the key advantages of stress testing is to cultivate a sense of shared ownership in the focal organisation.

### Tailoring

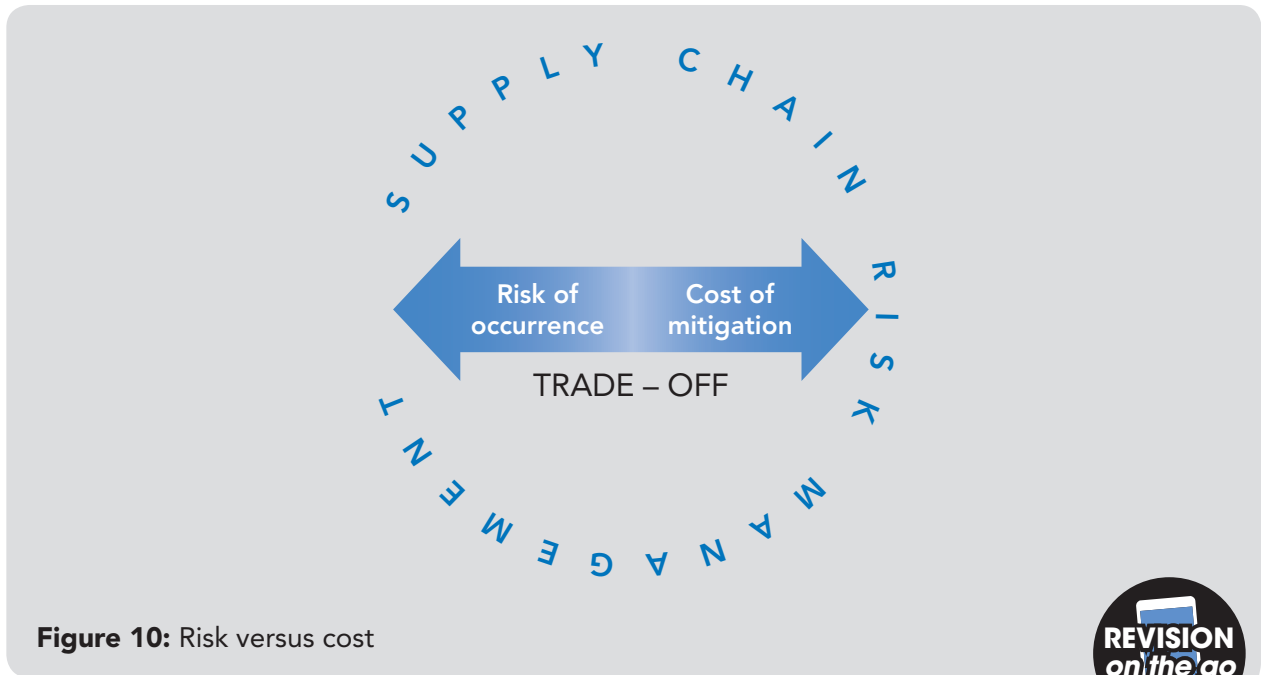
As each organisation is different in its operations, it is imperative that SCRM strategy is specific to the focal organisation’s operations. However, the general focus of tailoring involves “building various forms of reserves, including inventory, capacity, redundant suppliers and responsiveness”. The challenge for managers is to achieve the trade-off between risk of occurrence and cost of risk

<sup>69</sup> *Ibid.* p. 56

<sup>70</sup> Chopra, S. and Sodhi, M.S. (2004), “Managing Risk to Avoid Supply-Chain Breakdown”, *MIT Sloan Management Review*, October 2004, Fall Issue, p. 12



mitigation (e.g. the cost of maintaining inventory)<sup>71</sup> as shown in Figure 10.



Taking a specific instance of risk mitigation in planning capacity, Chopra and Sodhi suggest a tailoring rule of thumb. This is shown in Table 8.

Nature of items	Type of supplier
High-risk and high-value	Responsive
Low-risk and fast-moving	Low cost, efficient

Source: Chopra and Sodhi (2004)

**Table 8:** Example of tailoring suppliers and items



### Improving supply chain

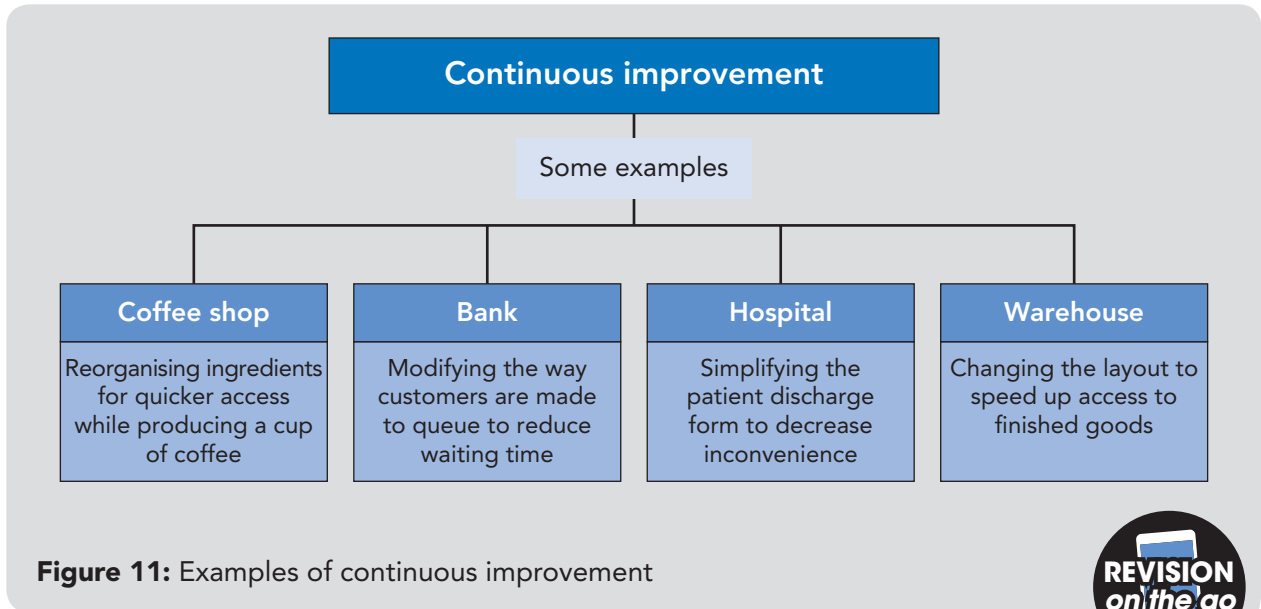
There is a developing view that although planning and control are important, a greater emphasis on improvement can produce better results. Improvement in a supply chain cannot be ad-hoc and periodic, but needs to be an integral part of the operations manager’s role. Improvement initiatives produce better results when the focal organisation develops an “improvement system”. This system is defined as one that:

*“ defines and covers all facets of an organisation’s operation, from identifying and meeting the needs of customers, design, planning, purchasing, manufacturing, packaging, storage, delivery and service, together with all relevant activities carried out within these functions. It deals with organisation, responsibilities, procedures and processes.”<sup>72</sup>*

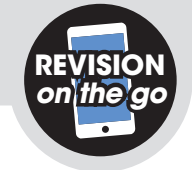
<sup>71</sup> Ibid.  
<sup>72</sup> Slack, Chambers and Johnston (2010), *Operations Management*, p. 546

## Continuous improvement

The premise that underpins continuous improvement is that a series of successive, incremental improvements can have a much more positive effect on supply chain performance than a single large one. Because the changes in continuous improvement are small, each takes effect without causing too much disruption to operations. However, it is important that the focal organisation maintains the momentum of improvement.<sup>73</sup> Some examples of continuous improvement are shown in Figure 11.



**Figure 11:** Examples of continuous improvement



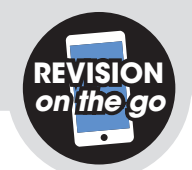
Continuous improvement has its origin in Japan. It is popularly known as “Kaizen” in the operations management literature. Kaizen’s scope is comprehensive and includes “continual improvement in all hard and soft aspects of operations”, such as “equipment, procedures, skills, quality, throughput time, supplier relationships etc.”<sup>74</sup>

Continuous improvement is different from “breakthrough improvement” The difference between the two is highlighted in Table 9.

Breakthrough Improvement	Continuous Improvement
Radically creative and “free thinking” approach. It involves complete rethinking and overcomes constraints.	Brought about by knowledge and experience existing in operations. It is driven by “adaptability, team work and attention to detail”.

Source: N. Slack (ed.) (1997)

**Table 9:** Breakthrough improvement compared to continuous improvement



<sup>73</sup> Slack, Chambers and Johnston (2010), *Operations Management*

<sup>74</sup> Lawson (2002), *Strategic Operations Management*, p. 303

## Collaboration

Collaboration is the coming together of organisational entities with the purpose of achieving a common economic goal. To do this, they invest resources, and share information, risks and rewards. Joint decision-making and problem-solving are other inherent characteristics of collaboration.<sup>75</sup>

“Businesses with a supply chain strategy require integration, co-operation and collaboration, which in turn demand aligned objectives, open communication, sharing of resources, risks and rewards.”

Soosay, Hyland and Ferrer (2008)<sup>76</sup>

## Competitive advantage

Chapter 1 highlighted the emerging view that the days of brand-driven competitive advantage are over. Industries are now characterised by inter-network rivalries<sup>77</sup> in which supply chain management underpins competitive advantage.

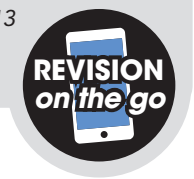
According to Harland,<sup>78</sup> the organisation that adopts the supply network strategy is able to achieve financial gains from a much wider geography than what is possible with its “in-house capabilities”. This becomes possible as the organisation gets the opportunity to manage the larger **value system** rather than just the limited internal **value chain**. This growth orientation is based more on the bolder “strategic intent” rather than a conservative “strategic fit”.

The advantages gained from supply networks are explained in Table 10.

Advantage	Example
Economies of scale	An automobile manufacturing plant can enjoy cost savings from buying raw material in bulk, and a healthy margin from distributing cars worldwide.
Economies of scope	A bank can spread its fixed costs over a range of services (e.g. retail banking, institutional banking, mortgage, insurance and share trading services), which also gives it a wider variety of customers.
Comparative advantage	A department store in a high-income country builds a network of suppliers in locations known for their specialisation (e.g. leather shoes from India, cotton clothing from Bangladesh, PVC luggage from China) to sell to customers.

Source: C. Harland in N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, p. 213

**Table 10:** Advantages of a supply network strategy



<sup>75</sup> C.A. Soosay, P.W. Hyland and M. Ferrer (2008), “Supply Chain Collaboration: Capabilities for Continuous Innovation”, *Supply Chain Management – An International Journal*, 13/2, p. 161

<sup>76</sup> *Ibid.* p. 160

<sup>77</sup> Lambert and Cooper (2000), “Issues in Supply Chain Management”

<sup>78</sup> C. Harland in N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, p.213

## ! NEED TO KNOW

Continuous improvement brings improvement in operations performance via small, incremental improvement actions. It achieves positive outcomes if momentum of actions is maintained on a continual basis.



## ✎ OVER TO YOU

### Activity 6: Continuous improvement

How could a higher education college adopt continuous improvement?

## Sustainability and ethical supply chain practices

### 📄 CASE STUDY: IKEA'S OPERATIONS (C)

#### Seeking suppliers' co-operation for sustainable operations

Most of the flat-pack furniture items IKEA sells are made of wood and glass, and this makes its products fragile. Many products are sourced from overseas locations and shipped over large distances. This makes packaging a necessary process in IKEA's operations. Polystyrene (EPS) foam has been a popular packaging material with corporations around the world because of its low cost, in spite of its many other drawbacks. Polystyrene cannot be recycled, and "takes thousands of years to decompose", therefore it can only be disposed of in landfills.



For many years, IKEA and its suppliers had been big users of polystyrene. However, with the corporation's growing focus on sustainability, it decided to replace polystyrene packaging in its flat-packs with a more environment-friendly material. To achieve this aim, IKEA decided to develop a suitable alternative, even though, in the initial stages, it met with resistance from its suppliers who worried about the high cost of the more sustainable packaging material. However, taking a partnership approach with its suppliers and co-workers, IKEA has managed to phase out polystyrene packaging by replacing it with a highly recyclable fibre-based material. In quantitative terms, they diverted from landfill 8000 tonnes of polystyrene, which equates to 7400 truck loads or more than half the volume of the Empire State building, in New York.

IKEA has not stopped looking for even better alternatives. Recently, they announced that they are exploring “fungi packaging” made from mushrooms. The sustainability manager at IKEA feels that this innovative and biodegradable packaging material will help them achieve their sustainability goals.

Source: IKEA Annual Summary 2016 and Gosden, E. (2016), “IKEA plans mushroom-based packaging as eco-friendly replacement for polystyrene”, *The Telegraph* [Online]. Retrieved from: <http://www.telegraph.co.uk/news/earth/businessandecology/recycling/12172439/ikea-plans-mushroom-based-packaging-as-eco-friendly-replacement-for-polystyrene.html>

Sustainability and ethical supply chain management are two integral elements of corporate social responsibility (CSR). CSR is defined as:

“ a company’s commitment to operating in an economically, socially and environmentally sustainable manner whilst balancing the interests of diverse stakeholders. ”

Slack, Chambers and Johnston (2010)<sup>79</sup>

According to Slack, Chambers and Johnston,<sup>80</sup> corporate social responsibility has five dimensions, shown in Table 11. Social responsibility, sustainable environment-friendly processes and ethical conduct are becoming critical factors in determining the reputation and performance of organisations. According to Bals and Tate,<sup>81</sup> there has never been greater pressure on organisations to adopt practices of sustainable supply chain management.

Sustainable supply chain management (SSCM) is defined as:

“ the management of material, information and capital flows as well as co-operation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements. ”

Seuring and Muller (2008)<sup>82</sup>

The dimensions of CSR	Definition
Environmental dimension (“sustainability” practices)	The focal organisation’s commitment to preserving the natural environment in the process of sourcing raw material and finished goods.
Social dimension	The empathy that the organisation displays towards society and the positive contribution that it makes to it.
Economic dimension	How an organisation aims to fulfil its profitability commitment.

79 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice, p. 633

80 *Ibid.*

81 Bals, L., and Tate, W. (2016), *Implementing Triple Bottom Line Sustainability into Global Supply Chains*, 1st Ed., Routledge

82 Seuring, S. and Muller, M. (2008), “From a literature to a conceptual framework for sustainable supply chain management”, *Journal of Cleaner Production*, Vol. 16, p. 1700

The dimensions of CSR	Definition
Stakeholder dimension	What the focal organisation does to reconcile the needs and expectations of its various stakeholders.
Voluntariness dimension	The ethical initiatives that the organisation takes of its own volition, which go beyond legal compliance.

Source: Slack, Chambers and Johnston (2010), *Operations Management*, p. 634

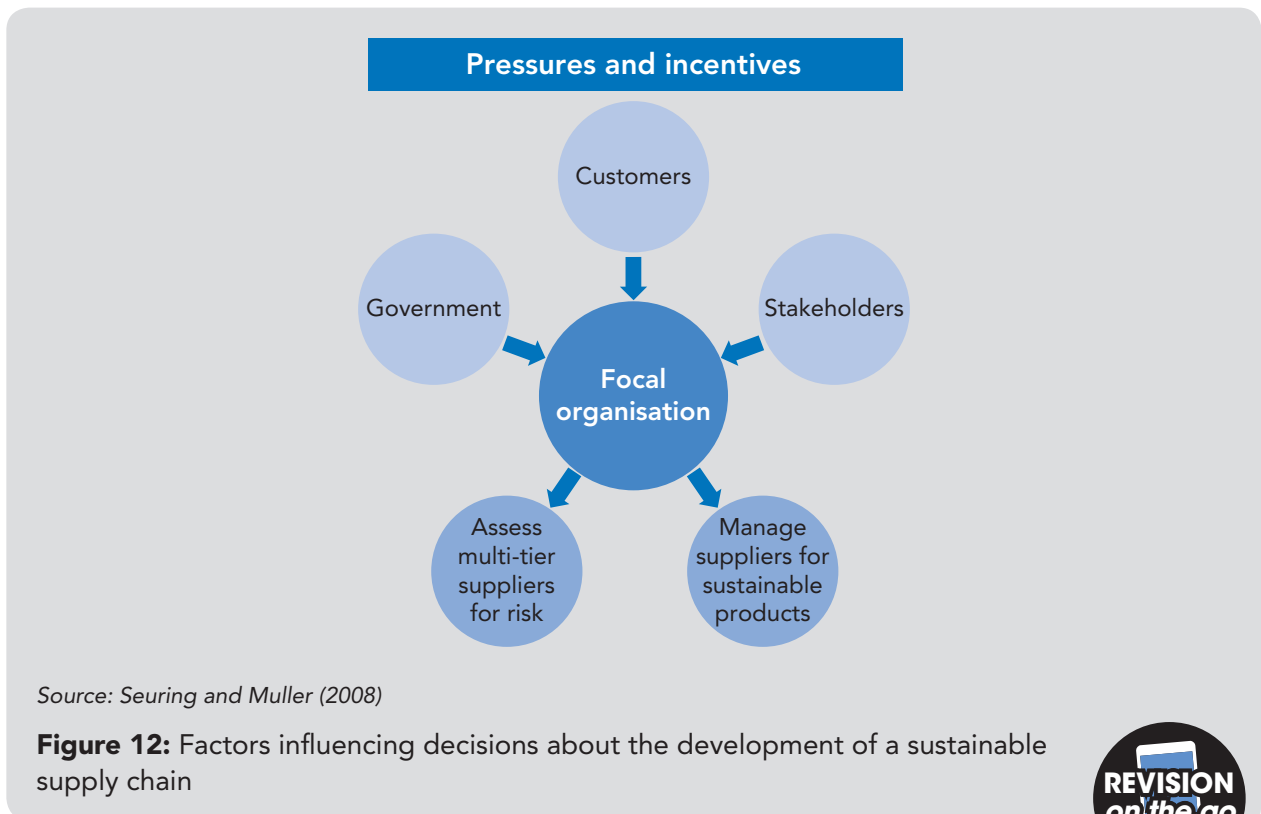
**Table 11:** The dimensions of corporate social responsibility



Customers' sensitivity towards sustainable products and services is growing, and organisations are increasingly aware that customers might reject their products if they do not meet sustainability expectations. Governments are also getting more stringent about sustainability norms.<sup>83</sup> Along with other pressures and incentives resulting from concern for the environment, these are forcing organisations to articulate an explicit policy on SSCM (see Figure 12) and put into action a positive SSCM strategy. Operations management is expected to identify the impact of its decisions on the environment and take appropriate and pre-emptive steps to build a sustainable supply chain. Some examples are highlighted in Table 12.

“There is a much increased need for co-operation among partnering companies in sustainable supply chain management.”

Seuring and Muller (2008)<sup>84</sup>



Source: Seuring and Muller (2008)

**Figure 12:** Factors influencing decisions about the development of a sustainable supply chain



83 *Ibid.*  
84 *Ibid.* p. 1706

Decision area	Key aspects of operations
Product/service design	Sourcing raw materials that can be recycled. Designing operations to reduce waste.
Network design	Environmental considerations in choosing a location. Choice of transport with the aim of reducing emissions.
Layout of facilities	Achieving efficiency in consumption of energy.
Process technology	Activities focused on waste disposal.
Supply chain planning and control	Carrying out physical distribution with minimum consumption of energy.

Source: Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management, 6th Ed.*, FT/Prentice Hall: p. 639

**Table 12:** Operations management and sustainability



## ! NEED TO KNOW

The five dimensions of corporate social responsibility are:

- 1 the environment dimension
- 2 the social dimension
- 3 the economic dimension
- 4 the stakeholder dimension
- 5 the voluntariness dimension



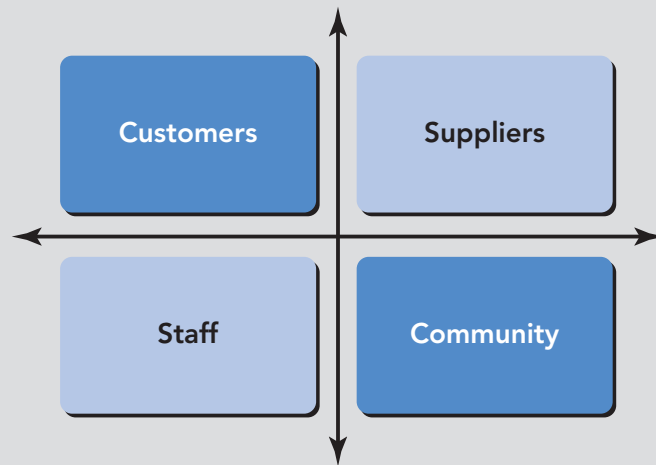
## ✎ OVER TO YOU

### Activity 7: Key aspects of operations

**You have been given the contract to design a small 25-bed hospital.  
For each of the decision areas in Table 12, write down one or two key aspects of operations that you will consider.**

## Ethics in supply chain management

The focal organisation’s ethical orientation has a direct impact on four groups: customers, staff, suppliers, and the community (see Figure 13).<sup>85</sup>



**Figure 13:** Groups affecting or affected by ethics in supply chain management



Examples of how a lack of ethics can affect supply chain management are given in Table 13.

Group	Examples of effect of lack of ethics
Customers	Physical harm from sub-standard ingredients used in food
Staff	Work stress
Suppliers	Forced labour or “poverty” wages (“sweat shops”)
The community	Environmentally harmful disposal of products after consumption

Source: Slack, Chambers and Johnston, (2010)

**Table 13:** Examples of the effect of lack of ethics on supply chain management



### OVER TO YOU

#### Activity 8: Ethics-related effects

- 1 For each group listed in Table 13, write down two more examples of how a lack of ethics could affect them.
- 2 Research the internet and, for each group, write down one real example of how a lack of ethics has affected that group.

<sup>85</sup> N. Slack (ed.) (1997), *Encyclopedic Dictionary of Operations Management*, p. 47





## OVER TO YOU

### Activity 9: Business strategy and CSR

Refer to the case study **IKEA's Operations (B)** on page 49.

- 1 Do you believe that an organisation's cost leadership strategy conflicts with the notion of suppliers' prosperity? If not, then how do you think a company can reconcile these two goals?
- 2 Read the report "IKEA Group sustainability strategy for 2020" at the link below and write down five specific actions that IKEA takes to achieve corporate social responsibility.

[http://www.ikea.com/ms/en\\_US/pdf/reports-downloads/sustainability-strategy-people-and-planet-positive.pdf](http://www.ikea.com/ms/en_US/pdf/reports-downloads/sustainability-strategy-people-and-planet-positive.pdf)

## Performance measures

Performance denotes the actions taken by operations managers to achieve these objectives in quantifiable terms. According to Slack, Chambers and Johnston,<sup>86</sup> a well-developed performance measurement system achieves two results:

- it establishes control
- it enables improvement

There are two main aspects of performance measurement (Neely, 1997).

- Effectiveness: the measure of efficacy in meeting customer requirements.
- Efficiency: the measure of cost-effectiveness achieved in using resources to meet customer requirements.

The operations performance measurement system can span two levels as shown in Table 14.

Levels	Measures
Composite performance measure	Customer satisfaction, agility and resilience
Generic operations performance measures	Quality, speed, dependability, flexibility and cost

Source: Slack, Chambers, and Johnston (2010)

**Table 14:** Levels of operations performance measurement



### ! NEED TO KNOW

Performance measurement is important because it establishes control and enables improvement.

There are two broad dimensions of performance measurement: effectiveness and efficiency.



## Service level agreements

A service level agreement (SLA) is a widely used instrument for measuring performance and achieving improvement. An SLA is a document that specifically defines the service/s required by the customer and quantifies the performance metrics related to the service/s that the supplier is expected to meet (Hiles, 2016). An SLA is defined as a document that:

“ describes the performance which needs to be delivered by the supplier. Key performance indicators (in terms of cost, service and quality levels) are agreed by both parties [buyer and supplier]. ”

van Weele (2010)

<sup>86</sup> Slack, Chambers and Johnston (2010), *Operations Management*, p. 606

Specific areas included in SLAs are strictly measurable. Examples include a maximum response time, the scope of service, and areas of responsibility.<sup>87</sup> This allows the buyer to include a payment clause linked to the fulfilment of the level of service to which the supplier has committed. The SLA can also include a bonus or penalty, based on whether the performance metrics are met or not (van Weele, 2010).

Service level agreements can either be between organisations, or between different departments or operations of the same organisation. The latter type of SLAs formalise the level of services to be provided by one operation within an organisation to another operation. SLAs objectively highlight any service shortfall and dissatisfaction, and can therefore be used for continual improvements in performance.

“SLA principles recognise that buyers and vendors can, and often do, have conflicting interests in managing costs and risks.”

Deloitte (2014)<sup>88</sup>

For example, in the past few years, several activities related to information technology have been commonly outsourced to specialist suppliers. One example of these activities is the resolution of queries raised by staff to the dedicated telephone-based IT helpdesk. The SLA between the buyer and the supplier can specify the limit of response time at two hours, which means that the support staff is expected to resolve any query either immediately or within two hours by making a return call to the complainant. Once the query is resolved, a simple electronic feedback system can easily measure the complainant's satisfaction level.

Slack, Chambers and Johnston state that a key drawback of SLAs is the emphasis on rigid formalisation of expectations, which can become a deterrent to building a trusting partnership.<sup>89</sup>

### Key Performance Indicators

Key performance indicators (KPIs) are another way of measuring performance. There should be a direct link between KPIs of operations and the organisation's competitive strategy. However, unless the intended strategy is well defined, operations KPIs cannot have a sharp focus.



## OVER TO YOU

### Activity 10: Performance metrics

**You are the purchase manager of a medium-sized organisation, and your company has purchased its first photocopier machine.**

**List four specific performance metrics that you would include in the service level agreement with the vendor.**

87 J. Mangan, J., and Lalwani, C. (2016), *Global Logistics and Supply Chain Management*, 3rd Rev. Ed., John Wiley and Sons, p. 231

88 Deloitte (2014), "Guiding principles to service level agreements" [online]. Retrieved from: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-service-level-agreements-BPO-121214.PDF>

89 Slack, Chambers and Johnston (2010), *Operations Management*



The generic operations performance measures are diagnostic. They can be numerous and measured frequently, and they offer deep insight into operations performance. Some examples of these measures are given in Table 15.

Performance measure	Example
Quality	Number of defective units in a batch of goods
Dependability	Number of times an airline experiences flight delays
Speed	Throughput time to prepare a burger in the new stores
Flexibility	Time taken to expand the clothing range in response to a sudden trend
Cost	Cost of sourcing a single consignment of goods from a particular supplier

Adapted from: Slack, Chambers and Johnston (2010)

**Table 15:** Example of generic operations performance measures



According to Slack, Chambers and Johnston,<sup>90</sup> the perspective of “market requirements” leads to improvement on two dimensions: customer orientation (what do customers need?) and competitive evaluation (how do competitors perform?).

They also highlight three competitive factors in meeting customers’ preferences (see Table 16).

<sup>90</sup> Slack, Chambers and Johnston (2010), *Operations Management*, p. 606

Factor	Significance
<b>Order winners</b>	Lead to more business if operations performance is improved
<b>Order qualifiers</b>	No increase in business if operations performance is improved
<b>Less important</b>	Of no importance in gaining extra business and therefore can be ignored

Source: Slack, Chambers and Johnston (2010)

**Table 16:** Customer-oriented operations performance improvement



## ! NEED TO KNOW

Improvements in operations performance that aim to meet customers' needs involve identifying and grouping factors into "order winners", "order qualifiers" and "less important".



## OVER TO YOU

### Activity 11: Generic operations performance measures

**Working in teams, write down five examples of performance measures for quality, dependability, speed, flexibility and cost.**

## READING LIST

- Chopra, S. and Meindl, P. (2015), *Supply Chain Management: Strategy, Planning and Operation*, 6th Ed., Global Edition, Pearson
- Christopher, M. (2016), *Logistics and Supply Chain*, 5th Ed., FT Publishing International
- Gardner, J.T. and Cooper, M.C. (2003), "Strategic Supply Chain Mapping Approaches", *Journal of Business Logistics*, Vol. 24, No. 2
- Mangan, J. and Lalwani, C. (2016), *Global Logistics and Supply Chain Management*, 3rd Rev. Ed., John Wiley and Sons
- Mentzer, J.T. (2000), *Supply Chain Management*, 1st Ed., Sage Publications
- Rushton, A., Croucher, P. and Baker, P. (2017), *The Handbook of Logistics and Distribution Management*, 6th Ed., Kogan Page
- Seuring, S. and Muller, M. (2008), "From a literature to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production*, Vol. 16 (2008), pp. 1699–1710

## Summary

- The scope of the operations function is limited and senior managers tolerate the "internal and external neutrality" of the operations function.
- The boundary of the operations function is not restricted to production and materials management, but also encompasses supplier relationship management, logistics, physical distribution management, and customer support operations.
- The focal organisation's competitive advantage is not just determined by the excellence of some of its operations, but also by managing the network that spans operations within the organisation and all their links to upstream operations.
- A supply chain is a group of partners who collectively convert a basic commodity into a finished product that is valued by end-customers, and who manage returns at each stage. It is a set of three or more companies directly linked by one or more of the upstream or downstream flows of products, services, finances and information from a source through to a customer. It can be a global network used to deliver products and services from raw materials to end customers in an engineered flow of information, physical distribution and cash.
- Mentzer classifies the supply chain into three categories: basic, extended and ultimate.
- All supply chains share three common properties:
  - the focal organisation collaborates with other organisations (suppliers and customers);
  - there are upstream and downstream flows of products, services, finances and information;
  - the supply chain has multiple processes that work together to deliver maximum value.
- The role of the supply chain manager includes managing:
  - global sourcing through multiple tiers of suppliers, some within the vertical limits of the organisation and others beyond its boundaries;
  - multi-locational facilities serviced by elaborate logistics comprising multiple modes of transport.
- Supply chain maps can be broadly classified into two types: straight flow and cyclic flow.

- A supply chain map is a strategic instrument enabling the organisation to clarify supply chain dynamics, identify supply chain risks, and build innovative, current, effective supply chains that offer sustainable competitive advantages.
- Supply chain risk refers to the possibility and effect of a mismatch between supply and demand. Risks can be internal or external and can come from three sources: suppliers, customers and the focal organisation.
- The notion of supply chain management has evolved from traditional operations when the management of the supply chain was viewed as management only of the “internal supply chain” comprising functions such as purchasing, materials control, production, sales and distribution.
- Two key advantages of managing networks are:
  - networks offer economies of scale and economies of scope in activities.
  - networks enable the organisation to overcome the constraints imposed by limited in-house resources and capabilities by offering the opportunity to achieve productivity and economic gains from other businesses’ resources.
- Supply chain risk management (SCRM) is an integral part of supply chain management. Three supply chain attributes that contribute to enhance the severity of disruption in operations are: density, complexity and node criticality.
- SCRM strategy requires a two-pronged approach: shared understanding, and fine-tuned risk mitigation.
- Stress testing is a “what-if” technique that involves three steps: identification, surveying and probing.
- SCRM strategy should be specific to the focal company’s operations as each organisation is different in its operations.
- The challenge for managers is to achieve the trade-off between risk of occurrence and cost of risk mitigation.
- Improvement in the supply chain cannot be ad-hoc and periodic but must be an integral part of the operations manager’s role.
- The premise that underpins continuous improvement is that a series of successive, incremental improvements can have a much more positive effect on supply chain performance than a large one.
- Continuous improvement is different from “breakthrough” improvement.
- Collaboration is the coming together of organisations with the purpose of achieving a common economic goal.
- The organisation that adopts a supply network strategy can reap financial gains from a much wider area than is possible with only its in-house capabilities.
- The advantages an organisation gains from supply networks are: economies of scale, economies of scope, and competitive advantage.
- Sustainability and ethical supply chain management are elements of corporate social responsibility (CSR).
- Social responsibility, sustainable environment-friendly processes and ethical conduct are becoming critical factors in determining an organisation’s reputation and performance.
- There are five dimensions of CSR: environmental, social, economic, stakeholder and voluntariness.
- Performance refers to the actions taken by operations managers to achieve the objectives in quantifiable terms.

# Chapter 3

## Procurement

### Introduction

A few decades ago, just a handful of organisations existed in most industries. The industry leaders either belonged to Western economies or Japan. Rivalry within each industry was not intense. The suppliers were local and buyer-supplier relationships were stable. Purchasing in this era was treated as a support function within an organisation. However, since the widespread deregulation of industries in the 1980s, along with the breaking of trade barriers and the arrival of the internet, most industries have experienced significant competition.

The economic ecosystem in almost every industry is evolving rapidly, and the opportunities to earn high margins through product differentiation have been declining. In this context, the purchasing function is gaining importance. The rationale behind this development is that purchases form a large proportion of the product cost, and therefore, even a small percentage of savings obtained from purchases creates a healthy opportunity to make value for the customers and achieve greater profit. Gains from strategic purchasing can be achieved more quickly than making changes to products.

In this chapter, you will learn about the evolution of purchasing into procurement, the ideas that underpin strategic purchasing, and the ways in which an organisation can successfully configure itself in the changing supply and demand landscape.

### Learning outcome

After completing the chapter, you will be able to:

#### **3 Analyse the role of procurement and procurement approaches**

### Assessment criteria

#### **3 Analyse the role of procurement and procurement approaches**

- 3.1 Discuss the meaning of organisational procurement
- 3.2 Analyse organisational procurement approaches



# Level 5 Operations Management

## 3.1 The meaning of organisational procurement

### Definitions of procurement

The history of buying is entwined with the economic history of mankind. Every organisation needs material inputs to do its work. As these inputs need to be bought from external individuals or organisations, purchasing is an integral part of every organisation's economic existence.

Purchasing is the activity that links the focal organisation to its external network. It is defined as:

*“ a function responsible for obtaining, by purchase, lease, or other legal means, equipment, materials, supplies and services required by an undertaking for use in production. ”*

Lysons (1996)<sup>91</sup>

#### CASE STUDY: BREXIT AND THE SUPPLY CHAIN

The European Union (popularly called the EU) is an integrated economic and political entity composed of 28 European countries with a market of 500 million people. Its foundation is built on the desire to share economic resources. As a result, the cross-border movement of products and labour is completely free, as it would be in a single domestic market.



Britain joined the EU in 1973 as one of its first few members. Over the years, because of some political and ideological reasons, there was a growing pressure from a section of the public, and also lawmakers (politicians), to leave the EU. In 2015, the British government of the day announced that there would be a national referendum to decide whether Britain should remain a member of the EU or exit the common market. The referendum was held in June 2016 and the majority of voters elected to leave the EU. However, the process of exiting is not so straightforward and there need to be protracted negotiations between the EU and British policy makers.

91 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing, p. 1

In the aftermath of the referendum, the value of Britain's pound sterling has fallen substantially, and the business environment has become unstable, as many supply chain risks unravel. One example of this is the row between Unilever and Tesco. In view of the currency depreciation, Unilever, the Anglo-Dutch multinational and one of the biggest manufacturers and suppliers of processed food, announced an increase in the price of many of its products. In response, Tesco, the supermarket giant, and one of Unilever's biggest customers, refused to carry Unilever's products on its shelves. There was an immediate decrease in the share price of both companies. The ramifications of BREXIT are still unfolding. Many recent reports indicate that procurement is in turmoil.

"With BREXIT-influenced supply chain disruption already underway, procurement departments are on the front line. Almost half of European businesses with UK suppliers are already finding replacements elsewhere in the EU" (Hurley, 2017).

"The [CIPS] survey found more than a third of UK supply chain managers intend to respond to BREXIT by pushing supplier costs lower and 11% admitted part of their operations may no longer be viable" (Green, 2017).

Source: BBC and various news websites



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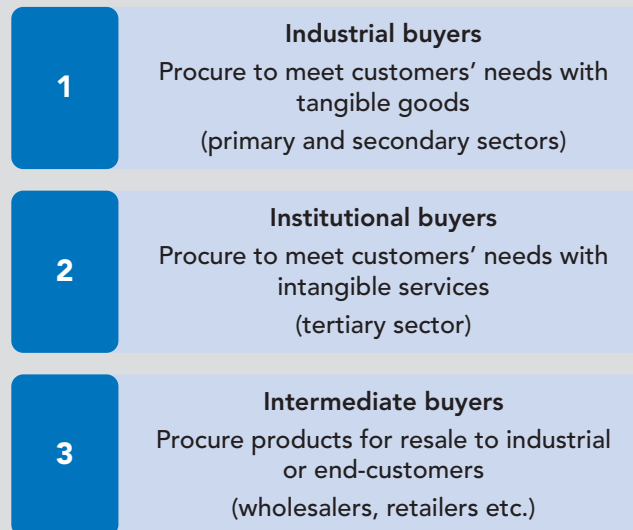
### Activity 1:

- 1 Read the news article at the link below.
  - 2 Discuss and then write down your answer to the question raised by the business correspondent Emma Simpson: "Who should absorb the increase in costs as a result of the weaker pound?"
- <http://www.bbc.co.uk/news/business-37639518>

In the modern economic landscape, there are three types of buyers<sup>92</sup> as shown in Figure 1. Between them, these buyers purchase a variety of goods and services to achieve operations objectives. According to their application and use, items purchased can be classified into six categories (Harland, 1997)<sup>93</sup> (see Table 1).

92 Marrian, J. (1965), "Marketing Characteristics of Industrial Goods and Products", in Wilson, A. (ed.), *The Marketing of Industrial Products*. London: Hutchinson

93 Harland, C. (1997), "Supply Chain Management", in Slack, N. (ed.), *Encyclopedic Dictionary of Operations Management*, p.160–161: Blackwell



Source: Adapted from: Marrian (1965) cited in Lyson (1996)

**Figure 1:** Types of buyers



Types of purchases	Example
Raw material	Inputs that have not been transformed in any way before purchase.
Semi-manufactured materials and components	Semi-transformed materials purchased from a supplier for further processing, usually to make them ready for end-customers.
Finished products	Ready-to-consume items that become the input for physical distribution systems or outbound logistics.
Packaging	A secondary yet distinct good that is essential for upstream movement of the finished goods in the physical distribution system.
Capital items	Usually high value items "which are purchased infrequently" but are essential in the transformation process. Examples include plant and machinery.
Services	These include a broad category of subcontracted services.

Source: Harland (1997)

**Table 1:** Categories of purchases, based on application and use

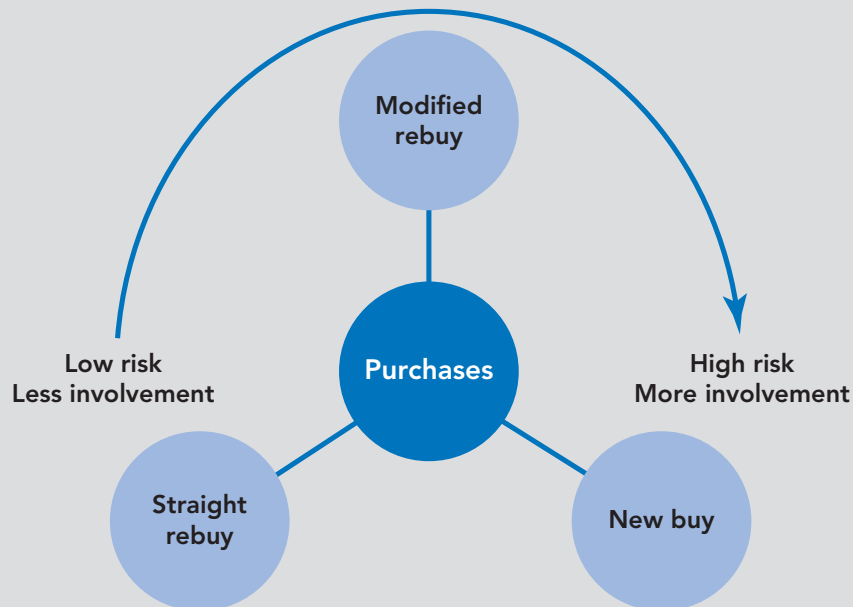


Robinson (1967) classifies purchases according to the buying organisation's familiarity of goods and services. These are listed in Table 2 and shown in Figure 2.

Type of purchase	Example	Level of decision-making
Straight rebuy <ul style="list-style-type: none"> <li>• Low value</li> <li>• High value</li> </ul>	Office supplies Machine parts	Low value items have low involvement. High value items involve multiple decision-makers
Modified rebuy	Purpose-built vehicle	Relatively higher involvement
New buy	Buildings and machinery	Complex decision with technical and financial implications, usually involves a "cross-functional" team decision

Source: Robinson et al. (1967) cited in Harland (1997)

**Table 2:** Types of purchases based on familiarity of organisation with the purchase



Source: Adapted from: Robinson (1967) cited in Harland (1997)

**Figure 2:** Classification of purchases based on how material is bought



On a fundamental level, the terms "buying", "purchasing" and "procurement" are synonyms. However, the contemporary competitive landscape is a "complex, inter-organisational setting of numerous suppliers"<sup>94</sup> and, in this context, many experts prefer to use the term "procurement", and treat it as a set of strategic activities proactively engaged with the dynamic supply market and responding to it in a creative manner in order to make a positive contribution to the focal organisation's performance (van Weele, 2009).<sup>95</sup>

94 Svahn, S. and Westerlund, M. (2009), "Purchasing Strategies in Supply Relationships", *Journal of Business & Industrial Marketing*, Vol. 24, Iss. 3/4, p. 173

95 Van Weele, A. (2009), *Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice*. 5th Rev. Ed., Cengage Learning

Procurement is defined as:

“ all activities required in order to get the product from the supplier to its final destination. It encompasses the purchasing function, incoming inspection, and quality control and assurance, allowing companies to make supplier selection decisions based on total cost of ownership (TCO), rather than price. ”

van Weele (2009)

Based on this perspective, purchasing becomes a sub-activity of the larger procurement function, and procurement is an integral sub-function of supply chain management. In other words, purchasing has evolved, and its scope has grown (Lysons and Farrington, 2005).<sup>96</sup> Many prefer to use the term “contemporary purchasing” (in contrast to “traditional purchasing”). In this study guide, we will use the terms “purchasing” and “procurement” interchangeably, unless the context demands a specific use.

“ Procurement is an integral part of supply chain management function, focused on the management of the part of the upstream, supplier-focused supply chain (sourcing). ”

Chick and Handfield (2014)<sup>97</sup>

The attributes of contemporary purchasing (or procurement) are highlighted in Table 3.

Attribute	Significance
Proactive (rather than reactive)	Initiates purchasing policies instead of following instructions
Relational (rather than transactional)	Aims to build long-term collaborative supplier relationships
Strategic (rather than tactical)	Contributes to achievement of corporate goals

Source: Lysons and Farrington (2005)

**Table 3:** Attributes of contemporary purchasing



## ! NEED TO KNOW

Purchases can be classified into three categories, according to the buying organisation’s familiarity with the goods and services to be purchased: straight rebuy, modified rebuy, and new buy.



<sup>96</sup> Lysons, K. and Farrington, B. (2012), *Purchasing and Supply Chain Management*, 8th Ed. Pearson

<sup>97</sup> Chick, G. and Handfield, R. (2014), *The Procurement Value Proposition: The Rise of Supply Management*, 1st Ed. Kogan Page



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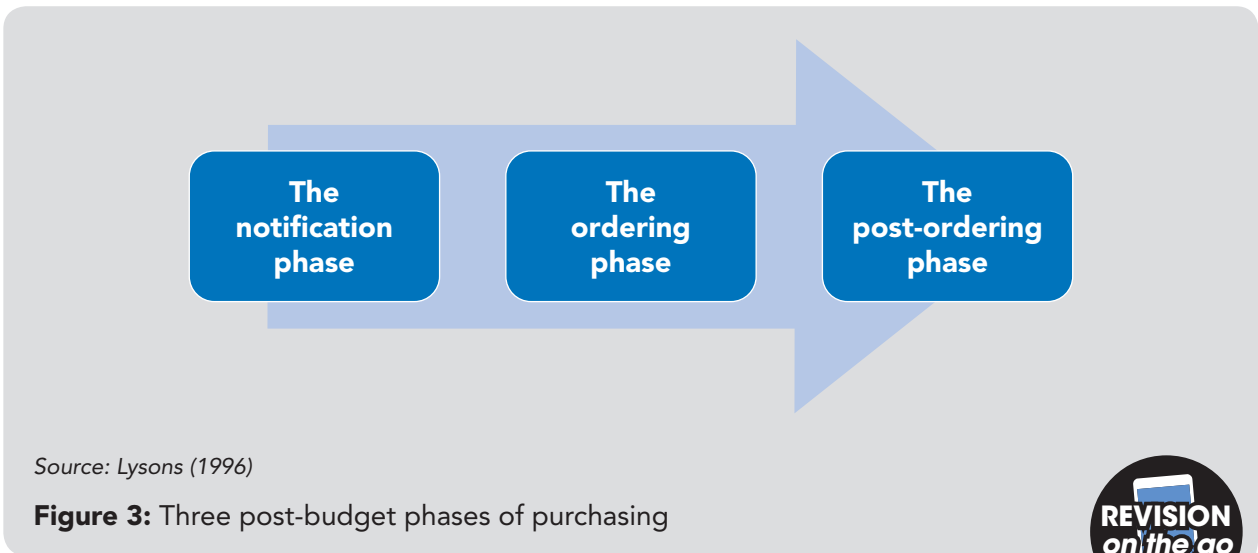
**Activity 2: Purchases**

- 1 Write down six items (goods and services) that a large manufacturing organisation might need to purchase, and classify each item according to its application and use.**
- 2 A bank wants to purchase special chairs for its disabled employees to use at the counter. In which category will you put these chairs?**
- 3 What is the most important and widely used capital item in a software development organisation?**

*Purchasing procedures*

Purchasing – from straight rebuys to new buys – is a highly complex procedure and documentation-driven activity. In most medium and large organisations, the momentum of purchasing is established in the annual departmental and divisional budgets. After the budgets are prepared, the activity of actual purchasing is divided into phases. According to Lysons (1996)<sup>98</sup>, there are three post-budget phases (as shown in Figure 3).

<sup>98</sup> Lysons, K. (1996), *Purchasing*, 4th Ed., pp.72–73. London: M&E Pitman Publishing

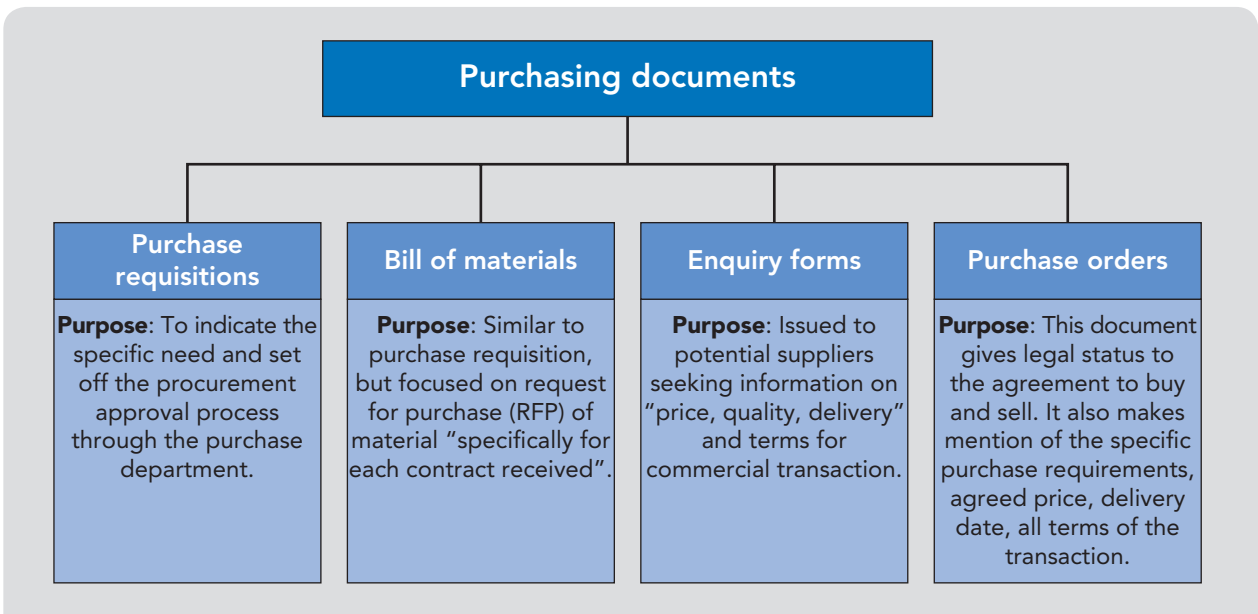


Source: Lysons (1996)

**Figure 3:** Three post-budget phases of purchasing

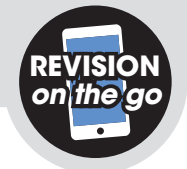


The important documents involved in the process of purchasing are shown in Figure 4 and explained in Table 4.



Source: Lysons (1996)

**Figure 4:** Key purchasing documents



**! NEED TO KNOW**

Purchasing has evolved from a clerical function into a strategic function. It is now considered a sub-function of a larger procurement function. In contemporary purchasing, the emphasis is placed on total cost of ownership (TCO) rather than price.



Phases	What it involves										
<b>The notification phase</b>	<p>There are two ways in which this takes place: the store issues a requisition, or the departments raise a bill of materials.</p> <p>The document can be for rebuys or new buys. The completed document moves to the purchase department.</p>										
<b>The ordering phase</b>	<p>The person assigned the task of purchasing checks the document from the notification phase for “accuracy, conformity to any standard specifications”, and maps it to the database of suppliers.</p> <p>A straight rebuy is usually a straightforward repeat order with an existing supplier.</p> <p>However, if it is a request for a specific modified rebuy or a new buy, the process has a few more steps, shown below.</p> <table border="1"> <tbody> <tr> <td><b>Enquiries</b></td> <td>“Sent to possible suppliers”.</td> </tr> <tr> <td><b>Quotations</b></td> <td>A highly specific response from the potential suppliers on “price, quality, delivery, total costs, and terms of business”.</td> </tr> <tr> <td><b>Negotiations</b></td> <td>Can occur “when quantities are substantial and quality and/or delivery are of great importance”.</td> </tr> <tr> <td><b>A purchase order</b></td> <td>After the negotiations have reached a mutually acceptable conclusion, a physical or electronic document is issued to the supplier specifying all the agreed commercial terms. If required by company policy, copies of this purchase order are given to relevant sections in other departments.</td> </tr> <tr> <td><b>An order acknowledgement</b></td> <td>This is a physical or electronic agreement to the purchase order provided by the supplier.</td> </tr> </tbody> </table>	<b>Enquiries</b>	“Sent to possible suppliers”.	<b>Quotations</b>	A highly specific response from the potential suppliers on “price, quality, delivery, total costs, and terms of business”.	<b>Negotiations</b>	Can occur “when quantities are substantial and quality and/or delivery are of great importance”.	<b>A purchase order</b>	After the negotiations have reached a mutually acceptable conclusion, a physical or electronic document is issued to the supplier specifying all the agreed commercial terms. If required by company policy, copies of this purchase order are given to relevant sections in other departments.	<b>An order acknowledgement</b>	This is a physical or electronic agreement to the purchase order provided by the supplier.
<b>Enquiries</b>	“Sent to possible suppliers”.										
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<b>An order acknowledgement</b>	This is a physical or electronic agreement to the purchase order provided by the supplier.										
<b>The post-ordering phase</b>	<p>The purchase department:</p> <ul style="list-style-type: none"> <li>• receives the ordered material by the agreed delivery date, or follows up if the delivery is delayed;</li> <li>• processes the supplier’s “advice note” on despatch and collection;</li> <li>• inspects received goods for quantity and quality;</li> <li>• raises the “goods received note” document;</li> <li>• raises a formal complaint for unsatisfactory supplies, if required;</li> <li>• processes the supplier’s “invoice” to release payment within the agreed time;</li> <li>• adds the satisfactory “purchase order” to the purchase database, and may record an evaluation and/or rating of the supplier’s performance.</li> </ul>										

Source: Lysons (1996)

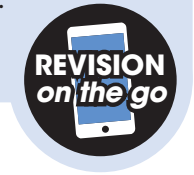
**Table 4:** Post-budget purchasing procedures





## ! NEED TO KNOW

The purchasing function is the link between the focal organisation and its suppliers. In the context of a supply network, the scope of purchasing has increased and it is widely referred to as procurement.



## ✎ OVER TO YOU

### Activity 3: Making a purchase order

**Download a purchase order template from the internet and make a purchase order for five different items of stationery that a small independent supermarket might need.**

## The strategic importance of purchasing

The evolution of purchasing into procurement (see Figure 5), which is a large and core component of supply chain management, happened as Michael Porter and Peter Kraljic developed influential frameworks.

Porter (1980)<sup>99</sup> put the spotlight on purchasing strategy, and brought it into the scope of competitive strategy in his book "Competitive Strategy". He highlighted the need for "stability and competitiveness of the supplier pool" through the notion of suppliers' bargaining power (the premise underpinning multi-sourcing), "allocation of purchases amongst qualified suppliers" (the premise underpinning supplier assessment and selection), and "creation of maximum leverage with chosen suppliers" (the premise underpinning partnership sourcing). Subsequently, Porter (1985)<sup>100</sup> elevated procurement as a key support activity in the definitive "value chain" model, and an important contributor to cost leadership and the differentiation dimension of business (competitive) strategy.

**“ The cost of procurement activities themselves usually represents a small if not insignificant portion of total costs, but often has a large impact on the organisation’s overall cost and differentiation. Improved purchasing strongly affects the cost and quality of purchased inputs, as well as of other activities associated with receiving and using the inputs, and interacting with suppliers. ”**

Porter (1998)<sup>101</sup>

Peter Kraljic’s authoritative article "Purchasing must become supply chain management" established the importance of integrating purchasing and supply chain management as businesses became

<sup>99</sup> Porter, M. (1980), *Competitive Strategy*, pp.122–123. New York: Free Press

<sup>100</sup> Porter, M. (1985), *Competitive Advantage*. New York: Free Press

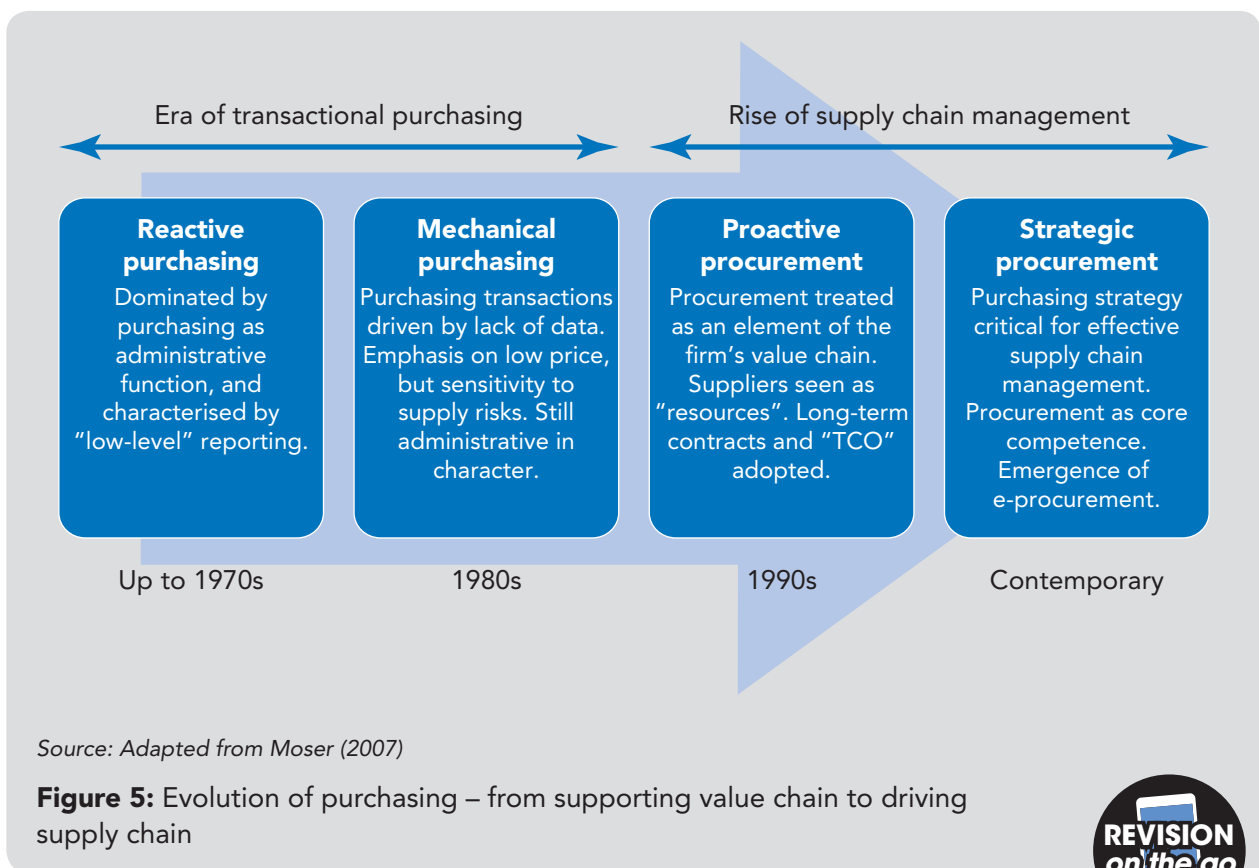
<sup>101</sup> Porter, M.E. (1998). *Competitive Advantage: Creating and Sustaining Superior Performance*, pp. 41. New York: Free Press

exposed to intense rivalries caused by new entrants in the aftermath of deregulation. Ramsay (2001)<sup>102</sup> calls this shift in thinking as the end of purchase function's "strategic irrelevance".

“ The stable way of business life many corporate purchasing departments enjoy has been increasingly imperiled. Threats of resource depletion and raw materials scarcity, political turbulence and government intervention in supply markets, intensified competition, and accelerating technological change have ended the days of no surprises. As dozens of companies have already learned, supply and demand patterns can be upset virtually overnight. ”

Kraljic (1983)<sup>103</sup>

As the brief extract from the article indicates, organisations operate in a turbulent environment. There are multiple forces that threaten operations and supply chains. The challenges are compounded as maximising sales becomes more difficult due to increasing rivalry and product parity. It is, therefore, imperative that organisations look for multiple drivers of profitability.



According to Lysons (1996)<sup>104</sup>, the extent to which procurement makes a strategic contribution to superior performance is determined by specific factors shown in Table 5.

102 Ramsay, J. (2001), "Purchasing's strategic irrelevance", *European Journal of Purchasing and Supply Management*, 7(4), pp. 257-263

103 Kraljic, P. (1983), "Purchasing Must Become Supply Chain Management", *Harvard Business Review*, Sept. 1983 Issue

104 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing

Procurement is highly strategic when	Procurement is less strategic when
The amount of total materials bought is a large percentage of the organisation's total expenditure	The amount of total materials bought is a small percentage of the organisation's total expenditure
Prices of bought-out material fluctuate frequently	Prices of bought-out material are relatively stable
Product innovation and fashion are critical to success	Products are staid and stable
End-consumer market has intense rivalry	End-consumer market has moderate competition

Source: Lysons (1996)

**Table 5:** Factors that define procurement's strategic importance



According to Kraljic (1983)<sup>105</sup>, procurement becomes strategic for the focal organisation when a large volume of critical items is required at a competitive price in either an uncertain or technologically fast-paced environment.

Joyce (2006)<sup>106</sup> gives four reasons that explain why procurement is now viewed as a strategic function.

- Bought-out material makes up a substantial proportion of the product costs, and therefore, the only way to source high quality material at the minimum price is with superior procurement.
- Supplier assessment and selection is critical for obtaining high quality material.
- Supplier management can lead to deliveries of material at the right time.
- Supplier participation can be a catalyst for superior product design, and as a consequence, a way of gaining a competitive advantage in marketplace.

### “ Relationship between purchases and product costs

*Bought-out material is over 50% of the product cost in the manufacturing organisations, and more than 90% of the product cost in the wholesale and retail enterprises.* ”

Joyce (2006)<sup>107</sup>

105 Kraljic, P. (1983), "Purchasing Must Become Supply Chain Management", *Harvard Business Review*, Sept. 1983 Issue

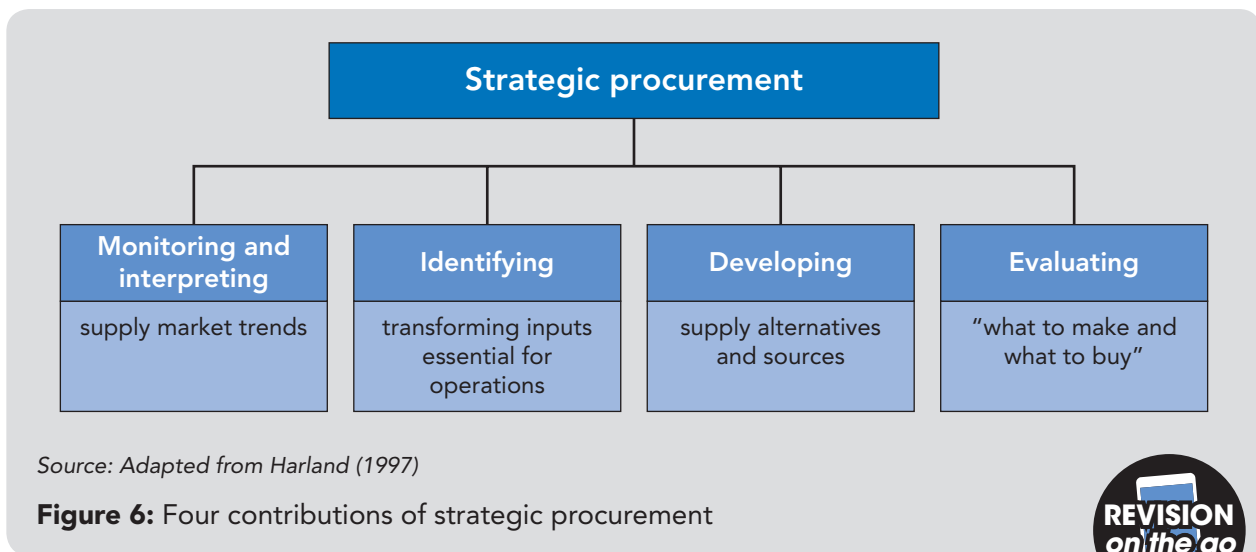
106 Joyce, W.B. (2006), "Accounting, Purchasing and Supply Chain Management", *Supply Chain Management: An International Journal*, Vol. 11, Iss. 3, pp. 202–207

107 *Ibid.*

Advocates of contemporary purchasing argue that purchasing should be aligned with the corporate and business strategies of the organisation (Fung, 1999)<sup>108</sup>. This helps the focal organisation's operations achieve its objectives, by making four key contributions (Harland, 1997) as shown in Figure 6.

## ! NEED TO KNOW

Procurement becomes more strategic to the organisation if the items have high critical importance and/or the competitive pace of business environment is fast.



Strategic procurement evaluates several aspects of critical decisions about the supply chain. Some of these are listed in Table 6.

- Identifying sensitive inputs and the risk of shortages
- Scanning the supply market for innovation in material and technology
- Reviewing expansion of supplier network
- Investigating cross-border procurement
- Evaluating "do or buy" decisions

Source: Lysons (1996)

**Table 6:** Critical decisions that strategic procurement can contribute to



According to Cousins and Spekman (2003)<sup>109</sup>, there is a strong and direct link between purchasing efficiency and performance. "Typically a 1% cost saving by purchasing equates to a 10% increase in sales" (cited in Lindgreen, Revesz and Glynn, 2009).<sup>110</sup>

108 Fung, P. (1999), "Managing Purchasing in a Supply Chain Context: Evolution and Resolution", *Logistics Information Management*, Vol. 12, Iss. 5, pp. 362–367

109 Cousins, P.D. and dan Spekman, R. (2003), "Strategic Supply and The Management of Inter and Intra Organisational Relationships", *Journal of Purchasing and Supply Chain Management*, Vol. 9, p. 20

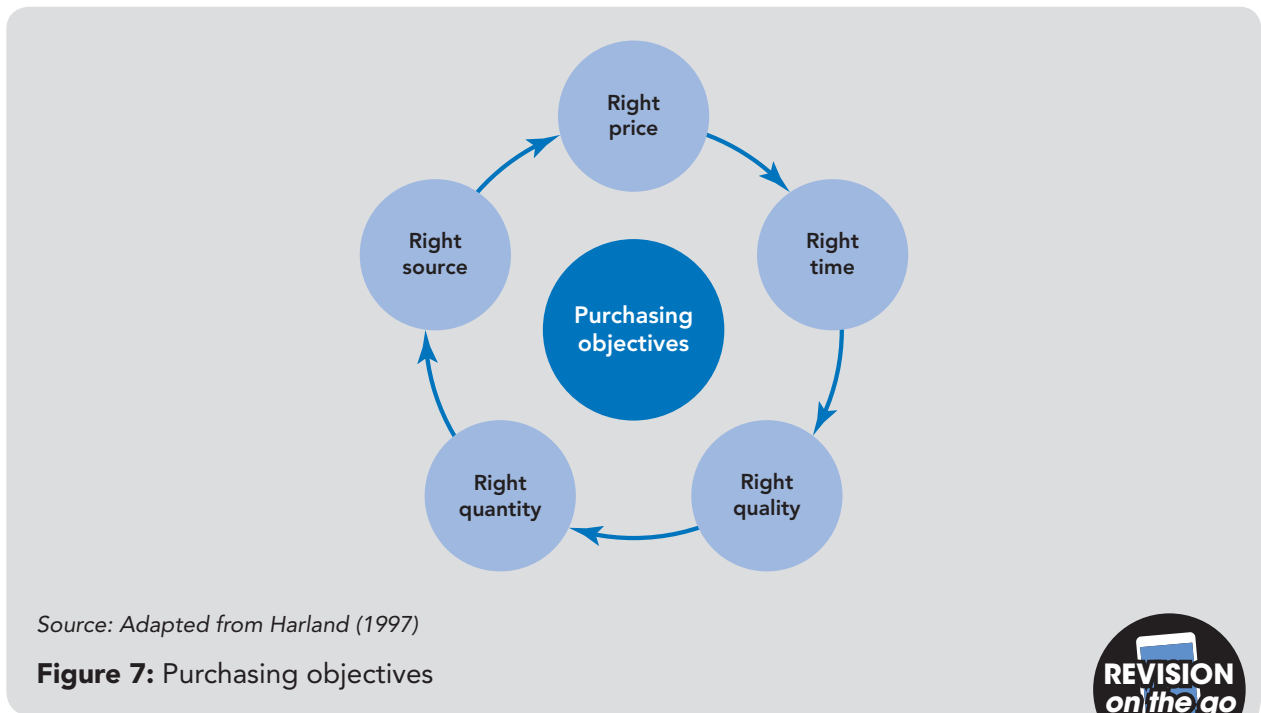
110 Lindgreen, A; Révész, B. and Glynn, M. (2009), *Journal of Business & Industrial Marketing*, Vol. 24, Iss. 3/4, p. 149

“Reduction in material costs in operations has a direct and positive impact on the focal organisation’s profitability.”

Slack, Chambers and Johnston (2010)<sup>111</sup>

## Purchasing objectives

Harland (1997)<sup>112</sup> states that there are five purchasing objectives. These are shown in Figure 7 and the significance of these objectives is explained in Table 7.



Purchasing objective	Significance
Purchasing at the right price	Profitability increases significantly even when purchasing costs decrease by a small amount
Purchasing at the right time and quantity	Operations speed and flexibility objectives are met
Purchasing at the right quality	Makes “non-value added” activities (e.g. inspection) redundant
Purchasing from the right source	Adoption of either single-source or multi-source strategy

Source: Harland (1997)

**Table 7:** The significance of purchasing objectives



111 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed. FT/Prentice Hall  
 112 Harland, C. (1997), “Supply Chain Management” in: Slack, N. (ed.). *Encyclopedic Dictionary of Operations Management*, Blackwell, p. 210–211

According to Lysons (1996)<sup>113</sup>, the generic purchasing objectives must be translated into specific objectives that represent corporate objectives. Some examples of these specific objectives are included in Table 8.

Focal organisation's corporate objectives	Purchasing objectives
Transition from speciality markets to mass markets	Evaluate suppliers with larger capacity, and willing to supply in a manner that does not result in excessive inventory costs
Aim for cost leadership	Adopt standardisation and decrease suppliers
Divestment from production activities without losing market share due to volume or quality	Seek reliable and responsive supplier capable of partnership sourcing, and willing to conform to purchasing policy

Source: Lysons (1996)

**Table 8:** Corporate objectives and purchasing objectives



The internet is causing investment in e-procurement systems, as many organisations – especially in the “automotive, engineering and petrochemical” industries – view it as an effective medium for achieving purchase objectives. E-procurement offers long-term gains from efficiency in the purchasing function, and can be an immediate channel for sourcing competitive pricing, cultivating supplier relationships and reducing transaction costs (Slack, Chambers and Johnston, 2010).<sup>114</sup>

“E-procurement is the use of the internet to organise all phases of the purchasing process, from managing purchase needs of various in-house operations to selecting supplier(s) with or without tendering, and awarding contracts.”<sup>115</sup>

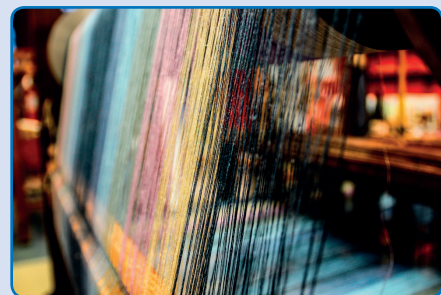
## Purchasing strategy

### CASE STUDY: OUTSOURCING

#### Reliable supplier offers material and expertise advantage

ABC Ltd. is a large clothing organisation with in-house manufacturing. One of the most important items in its operations is the thread. The item runs on the production line along with the fabric. In many instances, the production line gets disrupted because of threads.

In a recent strategy meeting, the managers were asked to identify manufacturing activities that could be outsourced or subcontracted. Managers were told that the most important deciding factor for this decision should not be cost savings but the presence of a reliable and responsive supplier who would also offer cost and quality advantages.



113 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing, p. 14

114 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall, p. 381

115 *Ibid.*

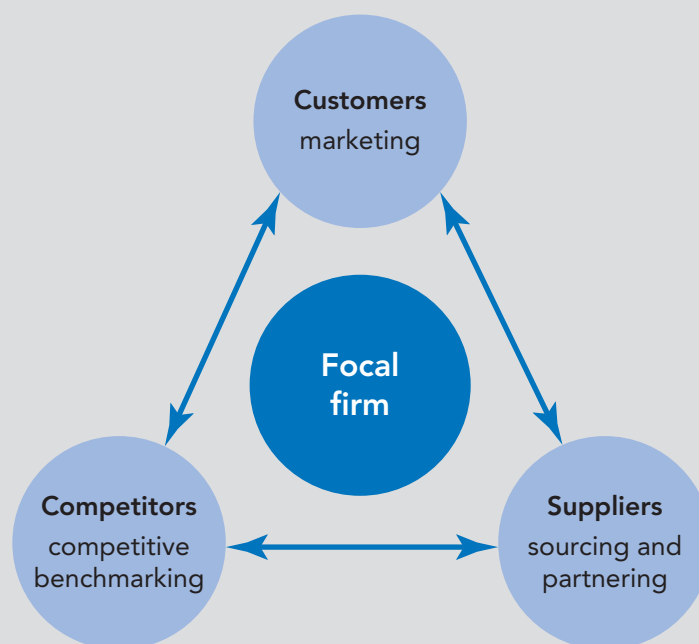
Managers at ABC studied the supply market and found that the multinational textile giant Coats Viyella specialises in serving clothing manufacturers with threads and all associated services. Their unique propositions are the “pay-as-you-use” price structure on the threads and on-site thread-related repair services on the production line. Coates Viyella works on a partnership model and performs in tandem with its customers’ production schedules because of the nature of the partnership agreement that emphasises transparent flow of information between the buyer and supplier. By taking full responsibility of order processing, storage and transportation logistics, it allows its customers to focus on their core activity of manufacturing clothes.

The managers at ABC can see the value in outsourcing activities related to thread.

*Adapted from: Lawson (2002)*

Traditional purchasing has primarily been a support role that sought to reduce the “spend” on bought-out material. Contemporary purchasing (procurement), however, has a bigger ambit. It strives to contribute to revenue by sourcing materials that have a positive effect on value creation (Johnsen, Howard and Miemczyk, 2014).<sup>116</sup>

The foundation of purchasing strategy is the growing belief that purchasing decisions can contribute to the achievement of corporate goals if purchasing is integrated with corporate and business strategy (see Table 8) (Lowson, 2002).<sup>117</sup> Therefore, suppliers and sourcing (purchasing), along with customers and competitors, are now treated as the trio of “the strategy triangle” that work in tandem to achieve corporate objectives (Tesfay, 2014)<sup>118</sup> (see Figure 8).



*Source: Adapted from Tesfay (2014)*

**Figure 8:** The “Strategy Triangle”



<sup>116</sup> Johnsen, T.; Howard, M. and Miemczyk, J. (2014), *Purchasing and Supply Chain Management: A Sustainability Perspective*. Routledge.

<sup>117</sup> Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*, p. 80: Routledge

<sup>118</sup> Tesfay, Y.Y. (2014), “Environmentally friendly cost efficient and effective sea transport outsourcing strategy: The case of Statoil”, *Transportation Research Part D: Transport and Environment*, Volume 31, pp.135–147.

The formalisation of purchasing strategies started with the understanding that the purchasing of different types of items should be treated differently. ABC analysis is one of the techniques (see Chapter 4) that classifies items into A, B and C classes, with A class items having the highest value and C class having the lowest value (Harland, 2002).

### *Kraljic's portfolio*

The notion of purchasing strategy got a boost when Kraljic (1983)<sup>119</sup> devised a 2 × 2 portfolio matrix that classifies items into four types (Figure 9) and mapped them on two parameters: profit impact and supply risk (see Table 9).

Kraljic's matrix brings "category management" into the purchasing function, and sets in motion a strategic process that makes a critical scrutiny of all the materials and products the organisation purchases from external suppliers. The emphasis is on cross-functional involvement and external suppliers' participation in achievement of organisational goals (O'Brien, 2015).<sup>120</sup>

**“** *Category management is the practice of segmenting the main areas of organisational spend on bought-in goods and services into discrete groups of products and services according to the function of those goods or services and, most importantly, to mirror how individual marketplaces are organised. Using this segmentation, organisations work cross-functionally on individual categories, examining the entire category spend, how the organisation uses the products or services within the category, the marketplace and individual suppliers.* **”**<sup>121</sup>

O'Brien (2015)



## OVER TO YOU

### Activity 4: Co-ordinating purchasing

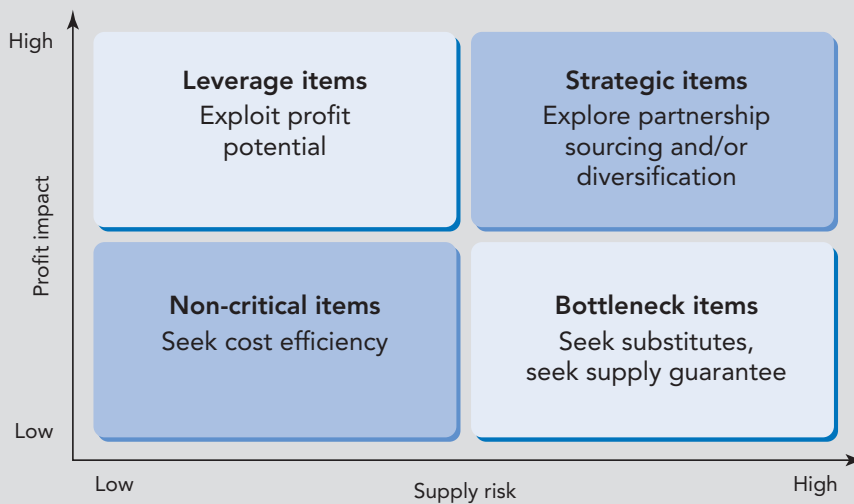
**Explain why co-ordination between purchasing and other organisational functions is important.**

119 Kraljic, P. (1983), "Purchasing Must Become Supply Chain Management" *Harvard Business Review*, Sept. 1983 Issue

120 O'Brien, J. (2015), *Category Management in Purchasing: A Strategic Approach to Maximise Business Profitability*, 3rd Ed. Kogan Page

121 *Ibid.*





Source: Kraljic (1983)

**Figure 9:** Kraljic portfolio matrix



Profit impact of a supply item	Supply risk of a supply item
Evaluated in terms of "volume purchased, percentage of total purchase cost or impact on product quality or business growth".	Assessed for "availability, number of suppliers, competitive demand, 'do or buy' possibility, storage risks and substitution possibilities".

Source: Kraljic (1983)

**Table 9:** Two parameters for evaluating four classes of items



Key factors resulting in an increase in the number of potential suppliers across the world include market reforms in a number of low-cost countries, globalisation, easy access to finance and technology. Such a landscape makes it easier for organisations to resolve the "do or buy" strategic dilemma, however, it also gives rise to a complex network of suppliers. This makes it imperative for the focal organisation to develop:

- an effective supplier relationship management; and
- a coherent supply strategy.

**“Organisations need contribution, clarity, confidence, closeness and collaboration from their suppliers, and so therefore we need the right relationships with the right suppliers in order to achieve this and unlock benefits.”**

O'Brien (2015)<sup>122</sup>

### Supplier preferencing framework

Supplier preferencing is also a 2 × 2 matrix that maps the supplier's perception of the focal organisation on two dimensions: the organisation's attractiveness to the supplier, and the supplier's dependency on the focal organisation (see Table 10).

122 O'Brien (2015), *Category Management in Purchasing*, p.18

Applying supplier preferencing is possible with a mix of judgement (for assessing attractiveness) and information (data about the focal organisation’s share of the supplier’s total revenue).

Supplier preferencing	
The focal organisation’s attractiveness to the supplier	The supplier’s dependency on the focal organisation
Evaluated in terms of “high volume, high spend, profit margin”, brand and other intangible reasons, ease of transactions (including receipt of timely payments), strategic alignment, and geographic proximity.	Assessed for how the supplier values the focal organisation’s magnitude of spend relative to its total revenue from all suppliers, and the financial and strategic impact to the supplier, if the focal organisation terminates the relationship.

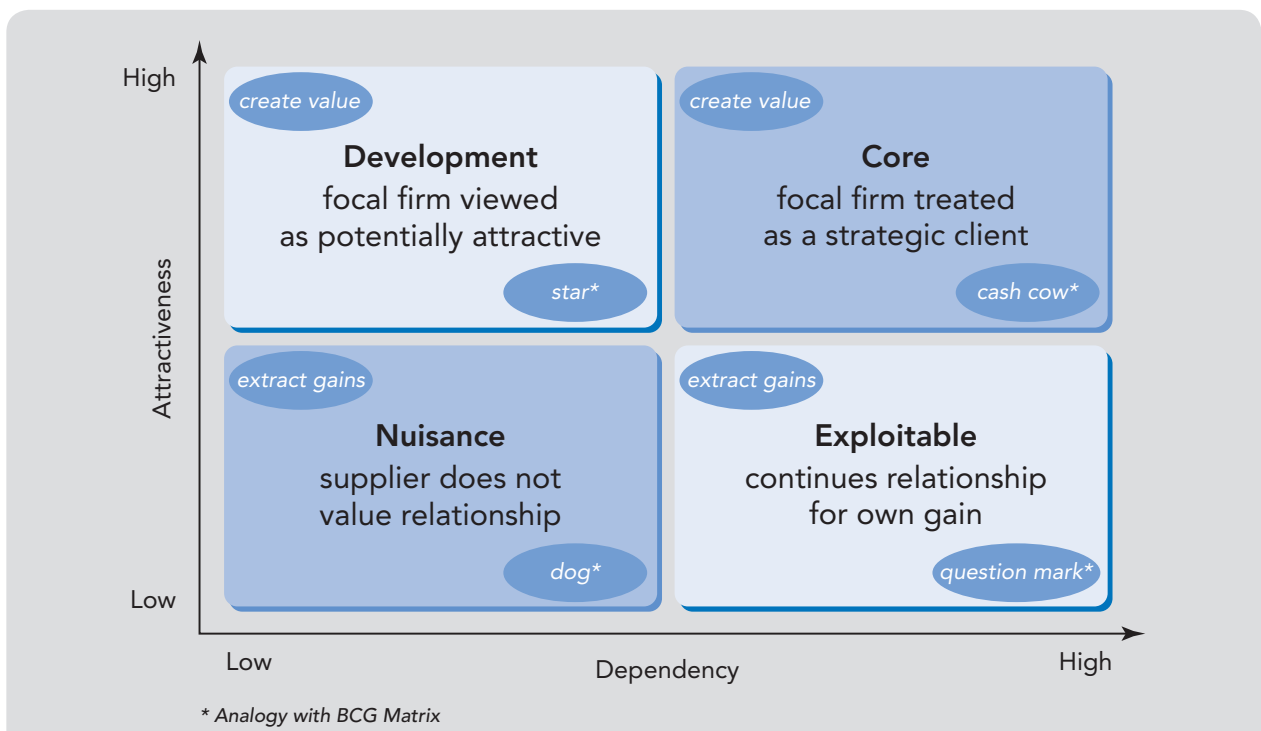
Source: O’Brien (2015)

**Table 10:** Two dimensions of supplier preferencing framework



The focal organisation can be classified into one of the four categories based on these two dimensions. This classification is shown in Figure 10.

In many ways, the supplier preferencing matrix can be likened to the widely known BCG matrix that categorises businesses of a diversified organisation into “cash cow”, “star”, “question mark” and “dog”. It is true to say that the supplier will invest more resources into and create more value for customers who fall into the “core” and “development” categories than “nuisance” and “exploitable” categories.



Source: O’Brien (2015)

**Figure 10:** Supplier preferencing framework



Supplier preferencing is important in managing a supplier relationship because it gives the procurement function the suppliers' view on how strategically they treat the focal organisation. The combined use of Kraljic's portfolio matrix and supplier preferencing gives the organisation a 360-degree perspective for developing its procurement strategy.

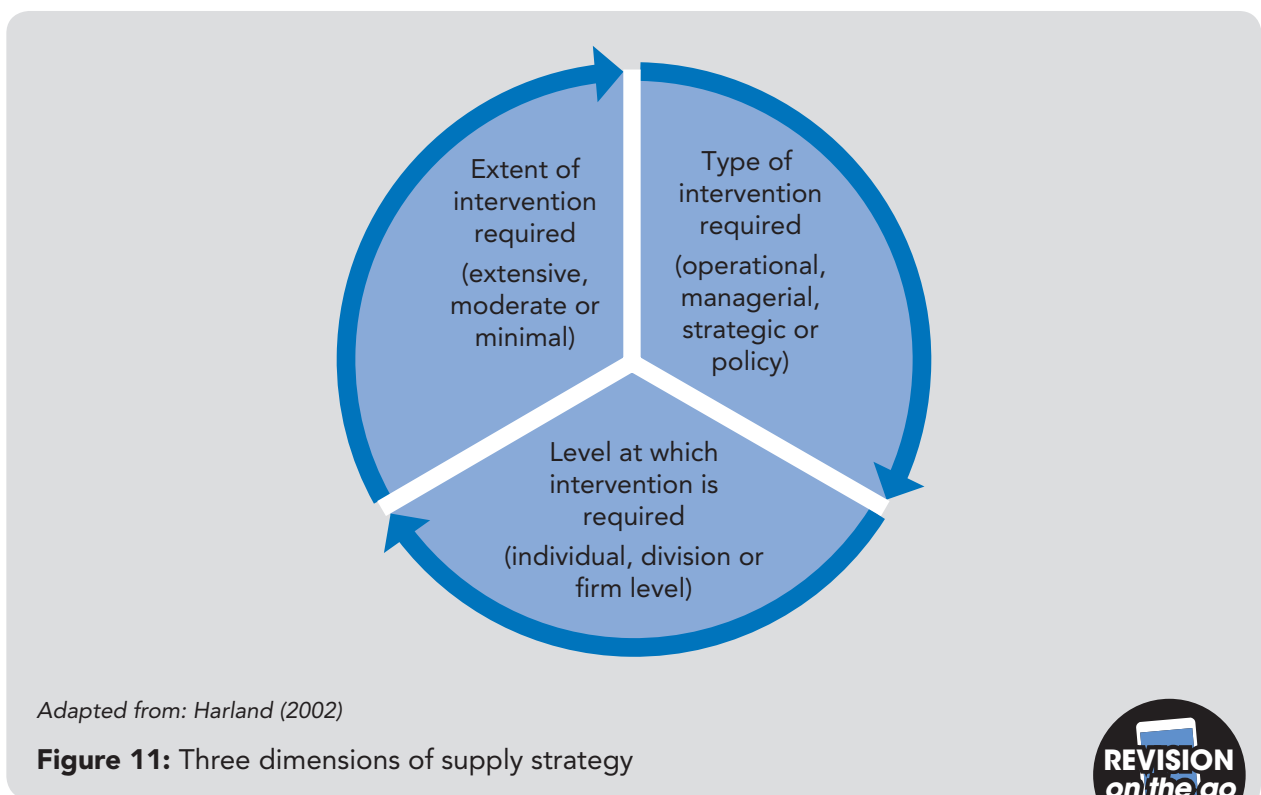
**! NEED TO KNOW**

Purchasing strategy is effective only if proper analysis of the critical importance of products and the buyer-supplier relationship is carried out.

**REVISION on the go**

*Supply strategy*

Harland describes supply strategy as a three-dimensional route to effective procurement. These dimensions are shown in Figure 11.



The extent of intervention in supply strategy can be extensive, moderate or low. The range of intervention responses is shown in Table 11, where 1 is the lowest level of intervention and 5 is the highest.

Level	Intervention	Explanation
1	Do nothing	Acceptance of unfavourable price rise due to "market imbalance". Cost is absorbed to insulate customer from increase.
2	React to cope	Negotiate price increase with customers. Involves managing risk of customer switching to another supplier.

Level	Intervention	Explanation
3	Counteract	Explore and expand the network of suppliers.
4	Proactively lead	Preventive actions resulting from on-going assessment of the market structure that involves cultivation of a reserve pool of suppliers.
5	Dominate	Deliberate and planned backward integration strategy at a corporate level that expands the scope of the organisation through acquisition of a key supplier. Achieves two objectives: control on supplies and an increase in cost for rivals.

Source: Harland (2002)

**Table 11:** Levels of intervention in supply strategy



There are several purchasing strategies, two of which are in the scope of this syllabus. These are:

- “Do or buy” purchase strategy
- Single versus multi-sourcing purchase strategy (discussed in section 3.2).

### “Do or buy” strategy

“Do or buy” is also known as “make or buy”, and defines the scope of the focal organisation’s operations. This strategy comes directly from the corporate strategy, and is a “micro version” of the strategic decision on vertical integration (Harland, 1997). When the organisation pursues a “do” strategy, manufacturing is an in-house operation, and therefore, the organisation requires a high level of capital investment and capacity creation.

“Do or buy decision by the focal organisation assesses whether to make a particular individual component or to perform a particular service itself, or alternatively buy it in from a supplier.”

Slack (1997)<sup>123</sup>

Three factors influence a “do or buy” decision, as listed in Table 12.

<b>Operational cost-based approach</b>	Involves evaluating cost savings and the associated “operational implications”.
<b>Business approach</b>	Decision is based on an evaluation of the supplier market by cross-functional teams in the focal organisation.

<sup>123</sup> Slack (1997), *Encyclopedic Dictionary of Operations Management*, p. 232

**Vertical integration**

This is a purely strategic decision that redefines the boundaries of the organisation. If the organisation decides to focus on a limited, manageable set of tasks with the aim of developing sharper capabilities and core competences, non-core activities are outsourced to specialist suppliers (discussed later in this chapter).

Source: Harland (1997)

**Table 12:** Three factors that influence a “do or buy” decision



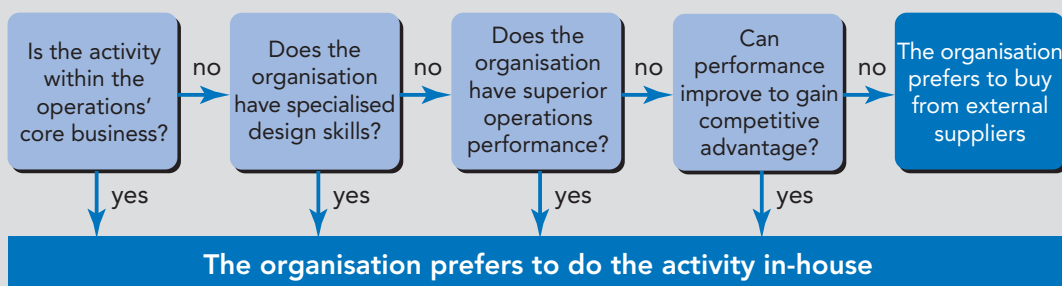
*The do or buy decision logic*

Typically, an organisation prefers a “do” strategy if they have developed specialised capabilities over the years. These skills are strategic, and therefore cannot be shared or transferred to external suppliers. However, if the organisation no longer enjoys the differentiation advantage arising from a unique product, or is suffering from inefficient operations that have little scope for improvement in cost and innovation, then a “buy” or outsource strategy may be more appropriate. This decision logic is shown in Figure 12 (Slack, Chambers and Johnston, 2010)<sup>124</sup>. Other specific factors that influence do or buy decisions are listed in Table 13.

Influencing factors	Do	Buy
Focus		✓
Maintain secrecy	✓	
Unreliable supply market	✓	
Small volume requirements		✓
Economies of scale		✓
Opportunity to recover overheads	✓	
Desire to retain flexibility		✓

Source: Harland (1997)

**Table 13:** Other factors that influence a “do or buy” decision



Source: Slack, Chambers and Johnston (2010)

**Figure 12:** The decision logic of “do or buy”



124 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall



## OVER TO YOU

## Activity 5: Do or buy

**An organisation currently manufactures 10,000 components per annum. The costs are as follows:**

<b>Costs</b>	<b>Total (\$)</b>
Direct material and labour cost	220,000
Manufacturing overhead costs	
Variable	10,000
Fixed	80,000
Non-manufacturing overheads	50,000
Total costs	360,000

**A supplier has offered to supply 10,000 components per annum at a unit price of \$30 for three years.**

**If the components are outsourced, the direct labour will be made redundant. The organisation also saves direct material costs and variable overheads. Fixed manufacturing overheads would be reduced by \$10,000 per annum, but non-manufacturing costs would remain unchanged. The facility has NO other use.**

**Is it better for them to make or buy the components?**

## 3.2 Organisational procurement approaches

### Sources of supply

There are multiple considerations here.

<ul style="list-style-type: none"> <li>Who can supply?</li> </ul>	The physical or electronic sources that can help the focal organisation to find suppliers.
<ul style="list-style-type: none"> <li>What can be the supply arrangements?</li> </ul>	Purchasing strategy after a strategic analysis using techniques such as Kraljic’s portfolio matrix and supplier preferencing.
<ul style="list-style-type: none"> <li>How to evaluate suppliers?</li> </ul>	The key factors that are involved in supplier assessment (see the following section on supplier assessment).

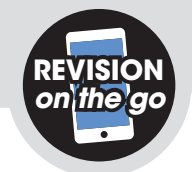
#### Who can supply?

There are a number of sources that can help the focal organisation to gain access to suitable suppliers. Refer to Table 14 for a selective list of sources of supplier information (Lysons, 1996).<sup>125</sup>

Catalogues	These are easy to find and contain “valuable technical information”.
Trade directories	These are useful tools for new buys, “unusual or occasional special requirements and emergency items”.
Yellow Pages	These have become very popular in recent years and are often the first source that the purchaser accesses. They offer a comprehensive list of suppliers in multiple categories.
Databases	These can be internal or external. There can be exclusive databases dedicated to specific product categories.
Exhibitions	These are physical short-duration events that offer a great opportunity to compare competing material and products, and meet suppliers for preliminary discussions. Exhibitions are usually focused on product categories related to a particular sector (e.g. construction material).
Trade journals	These are highly focused sources of supply and can often directly lead to the suitable suppliers.
Salespersons and references	Very common sources that can offer valuable information and lead to the potential suppliers.

Source: Lysons (1996)

**Table 14:** Sources of information about suppliers



<sup>125</sup> Lysons, K. (1996), *Purchasing*, 4th Ed., p. 236. London: M&E Pitman Publishing



## OVER TO YOU

**Activity 6: Sources of supply**

**A large supermarket plans to buy two refrigerated delivery vans. What do you think would be the best source of information about suppliers?**

*Supply arrangements*

Supply arrangements are at best determined by the strategic analysis using the techniques discussed in the purchasing strategy section. The focal organisation can adopt a combination of supply arrangements based on three sets of alternatives mentioned by van Weele (2008)<sup>126</sup>, and explained in Table 15.

**Global versus local sourcing**

This is determined by several factors such as the type of product and total cost of ownership. From the perspective of a western organisation based in a highly industrialised economy:

- local sourcing is preferred when the product is high technology, product specifications change frequently, flexible and precise delivery is required and communication is critical
- global sourcing is preferred for “bulk or standardised” products, as the price difference offered by local and international suppliers is large, and economies of scale can be gained from bulk purchasing and long distance transportation.

**Single versus multi-sourcing**

The choice between these two alternatives is a direct outcome of supply chain risk analysis (see Chapter 2), portfolio analysis and supplier preferencing. Using a sole supplier has a high level of risk, while having multiple suppliers brings a high cost of administration. See the following section on single and multi-sourcing.

126 van Weele, A.J. (2010), *Purchasing and Supply Chain Management*, 5th Ed. Cengage Learning



### Partnership versus competitive bidding

The choice between these two alternatives is again a strategic decision that is determined by analysis. The focal organisation's openness to sharing vital information with a strategic supplier, who may also be supplying to competitors, is a key factor in deciding to form a close and mutually beneficial partnership that emphasises greater supplier involvement in decisions related to product design and materials.

Competitive bidding involves a number of suppliers. This is adopted if the organisation wants to spread the risk of requiring a large quantity by allocating small volumes to multiple "pre-approved" suppliers, based on price attractiveness. Competitive bidding is also called "**tendering**". The invitation issued by the buyer to suppliers is called the "tender notice".

Source: van Weele (2008)

**Table 15:** Three types of supply arrangements

REVISION  
on the go

“*Tendering is a purchasing procedure whereby potential suppliers are invited to make an organisation an unequivocal offer of the price and terms, which on acceptance, shall be the basis of the subsequent contract.*”

Lysons (1996)<sup>127</sup>

## Supplier assessment

It is not possible to design an outcome-driven supply chain without appropriate suppliers. According to Freytag and Mikkelsen (2007)<sup>128</sup>, two factors underpin the focal organisation's assessment and selection of suppliers:

- the extent to which the focal organisation creates value by itself;
- the extent to which value can be created in relationships with suppliers;

However, assessing and selecting suppliers is not a straightforward task. The decision involves trade-offs (see Figure 13) because the degree of "superiority" between suppliers is mostly small. The process, therefore, involves identifying short-term and long-term factors, and rating them for their criticality (Slack, Chambers and Johnston, 2010)<sup>129</sup>. These factors are listed in Table 16.

Factors associated with supplier	
Short-term factors	Long-term factors
<ul style="list-style-type: none"> <li>• Flexibility to match the organisation's volume and quantity requirement</li> <li>• Dependability and response time</li> </ul>	<ul style="list-style-type: none"> <li>• Capabilities – technical, operations, financial, managerial</li> <li>• Commitment to business</li> </ul>

127 Lysons (1996), *Purchasing*, p. 332

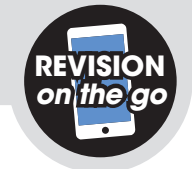
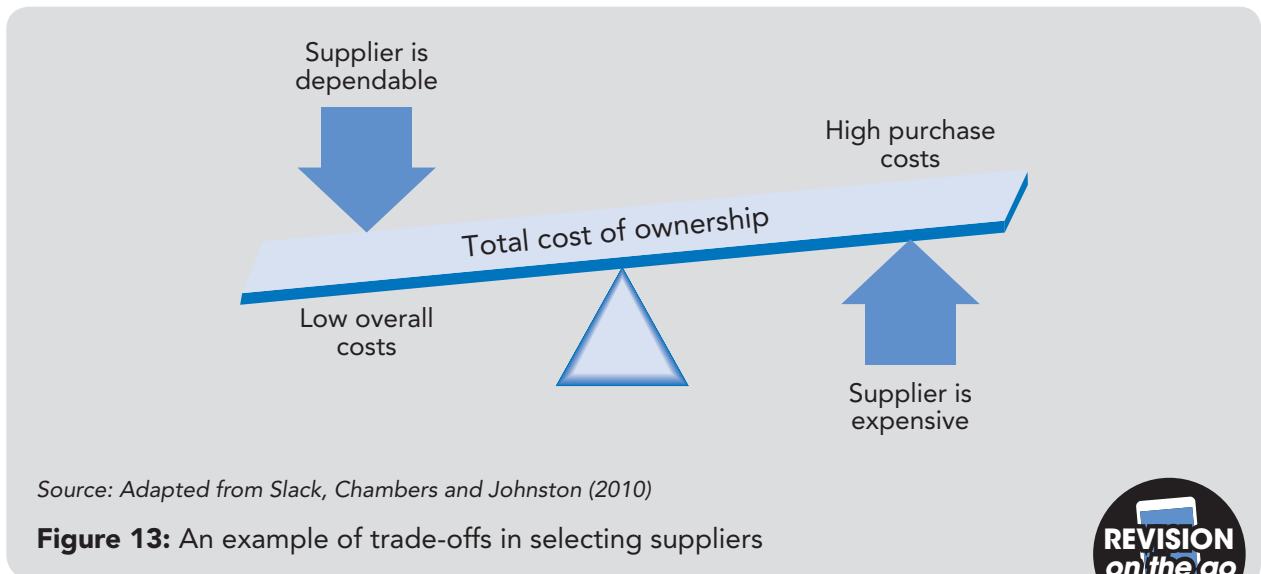
128 Freytag, P.V. and Mikkelsen, O.S. (2007), "Sourcing from Outside – Six Managerial Challenges", *Journal of Business & Industrial Marketing*, Vol. 22, Iss. 3, pp.187–195

129 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed., FT/Prentice Hall

Factors associated with supplier	
Short term factors	Long term factors
<ul style="list-style-type: none"> <li>• Range and quality of material</li> <li>• Cost effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>• Partnering attitude</li> <li>• Desire to innovate</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 16:** Factors for supplier assessment



In many instances (e.g. when using a new supplier), the focal organisation may decide to assess and select the supplier based on qualitative factors such as capability demonstrated in the prior experience of the supplier’s executive team.

**OVER TO YOU**

**Activity 7: Supplier selection**

**Your friend Chang plans to open a grocery shop. What advice would you give him about selecting suppliers?**



## Single-sourcing and multi-sourcing

Should an organisation have one highly dependable supplier or multiple suppliers? This is one of the key decisions that purchase managers need to make.

**Single-sourcing:** As the name indicates, this involves sourcing supplies from a single supplier. Single-sourcing is different from “sole-sourcing”. The latter is where there is a monopoly supply market so that the focal organisation has no choice of supplier.

“Single sourcing is the practice of obtaining all of one type of input product, component or service from a single supplier.”

*Slack, Chambers and Johnston (2010)<sup>130</sup>*

**Multi-sourcing:** This is in contrast to single-sourcing. The focal organisation has multiple suppliers.

“Multi-sourcing is the practice of obtaining the same type of product, component or service from more than one supplier in order to maintain market bargaining power or continuity of supply.”

*Slack, Chambers and Johnston (2010)<sup>131</sup>*

Both single-sourcing and multi-sourcing have their advantages and disadvantages (see Table 17).

Single-sourcing	Multi-sourcing
<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Overall lower costs due to:                             <ul style="list-style-type: none"> <li>• economies of scale arising from large orders;</li> <li>• lower transaction costs due to leaner administration and less dispersed negotiation.</li> </ul> </li> </ul>	<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Supplies are almost immune to disruptions at the suppliers’ end due to multiple sources.</li> <li>• The focal organisation has greater bargaining power due to its ability to create a competitive supplier market (“play-off” suppliers) by varying transaction volume and value for each supplier.</li> </ul>

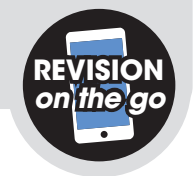
130 Slack, Chambers and Johnston (2010), *Operations Management*

131 *Ibid.*

Single-sourcing	Multi-sourcing
<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Potential for stronger business relationships and better communication.</li> <li>• Potential to become familiar with needs results in better planning and control, which leads to the opportunity to decrease inventory-holding costs and meet quality expectations.</li> <li>• Opportunity for partnerships in developing new products and innovation in processes.</li> </ul>	<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Greater potential for evaluating suppliers' performance and their capability to meet requirements. This facilitates making a decision about which suppliers are good candidates for a long-term partnership.</li> <li>• Opportunity to gain crucial information on supply market trends, prices and new materials.</li> </ul>
<p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• The focal organisation faces a greater supply chain risk as any kind of failure at the supplier's end can disrupt operations.</li> <li>• Bargaining power lies with the supplier, especially when it has been chosen for special reasons, which raises the risk of a sudden increase in price.</li> <li>• It restricts the access to critical information on supply market trends, prices and new materials.</li> <li>• Suppliers can take advantage of the situation and reduce their commitment to delivery deadlines and/or quality.</li> </ul>	<p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Economies of scale are lost as order size is distributed among many suppliers.</li> <li>• Administrative expenses are greater than for single-source strategy. There is a risk of creating an opportunistic business relationship with suppliers if the focal organisation frequently changes the transaction volume. If suppliers are uncertain about orders, their commitment may be low.</li> <li>• Some suppliers may be reluctant to share information due to the risk of it leaking to their rivals in the focal organisation's network.</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 17:** Single-sourcing versus multi-sourcing



“Multi-sourcing allows the buyer to reduce the contribution margins of suppliers, single-sourcing reduces cost but not necessarily margins.”

Johnsen, Howard and Miemczyk (2014)<sup>132</sup>

There is no single one-size-fits-all sourcing strategy in supply chain management. The focal organisation can switch from single to multi-sourcing, or vice versa, and this decision could be

<sup>132</sup> Johnsen, T., Howard, M. and Miemczyk, J. (2014), *Purchasing and Supply Chain Management: A Sustainability Perspective*. Routledge

triggered by one or more factors. Some of these factors include purchasing and quality assurance procedures, location issues, and performance and reliability of the supplier. However, while single-sourcing facilitates **lean operations**, multi-sourcing can be useful for creating a highly competent network that strives to improve in order to survive and grow.

### ! NEED TO KNOW

Single-sourcing and multi-sourcing are two alternative purchasing arrangements. Both have their advantages and disadvantages.



### OVER TO YOU

#### Activity 8: Single versus multi-sourcing

**Your friend from Activity 7 is planning to sell dairy products, as there is a high demand for them throughout the year.**

**What advice would you give him about adopting single-sourcing or multi-sourcing for dairy products?**

## Partnership sourcing

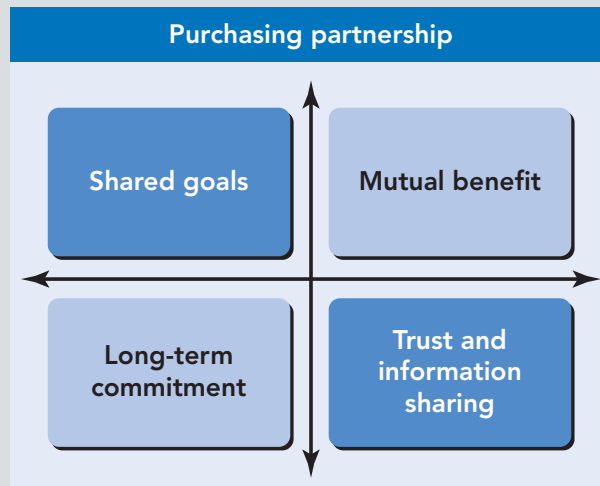
Partnership sourcing, also known as “purchasing partnership” or “supplier partnerships”, is the focal organisation’s strategic response to manage margins in the fast-moving, hyper-competitive environment (Ellram, 1991)<sup>133</sup>. It is viewed as the foundation for building lean operations. Four key features of partnership sourcing are shown in Figure 14.

<sup>133</sup> Ellram, L.M. (1991), “Supply Chain Management: The Industrial Organisation Perspective”, *International Journal of Physical Distribution & Logistics Management*, Vol. 21, Iss. 1, pp.13–22

Partnership sourcing is defined as:

“ Purposive strategic relationships between independent organisations who share compatible goals, strive for mutual benefit, and acknowledge a high level of mutual interdependence. ”

Mohr and Spekman (1994)<sup>134</sup>



Source: Adapted from Slack, Chambers and Johnston (2010)

**Figure 14:** Features of purchasing partnership



“ The foundation of partnership sourcing is laid on the analysis of the supplier’s ability to add value to the focal organisation’s long-term purchasing requirements. ”

Brown, Boyett and Robinson (1994)<sup>135</sup>

Lysons (1996)<sup>136</sup> differentiates between traditional sourcing and partnership sourcing (see Table 18).

Nature of difference	Traditional Sourcing	Partnership Sourcing
Qualitative	Competitiveness and self-interest; short-term business relationship	Co-operation; long-term relationship with high supplier involvement
Quantitative	Buyer’s focus on price	Buyer’s focus on total cost of ownership

Source: Lysons (1996)

**Table 18:** Traditional sourcing versus partnership sourcing

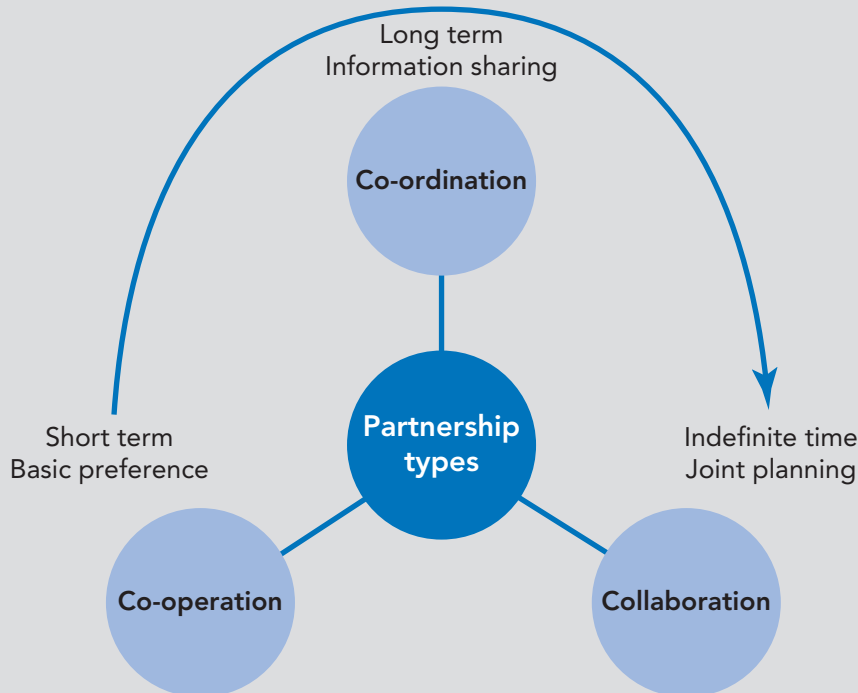


134 Mohr, J. and Spekman, R. (1994), “Characteristics of Partnership Success: Partnership Attributes, Communication Behaviour and Conflict Resolution Techniques”, *Strategic Management Journal*, Vol. 15, Feb. Issue, p 135

135 Brown, A.D.; Boyett, I. and Robinson, P. (1994). “The Dynamics of Partnership Sourcing”, *Leadership & Organisation Development Journal*, Vol. 15, Iss. 7, p. 16

136 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing, p. 254

Based on the intensity of the link between the focal company and the supplier, partnerships are classified into three types: co-operation, co-ordination and collaboration. Partnerships offer the benefits of low administrative costs and “increased productivity” (Harrison and Van Hoek, 2005)<sup>137</sup> (see Figure 15).



Source: Harrison and Van Hoek (2005)

**Figure 15:** Three types of partnerships



Partnership sourcing differs from traditional sourcing in many ways. The focus of partnership sourcing is on building long-term supplier relationship. The highest level of partnership is a sound collaboration in which the supplier is involved in many key decisions, including product design and material selection. The focus of partnership sourcing is NOT on price, but on total cost of ownership.



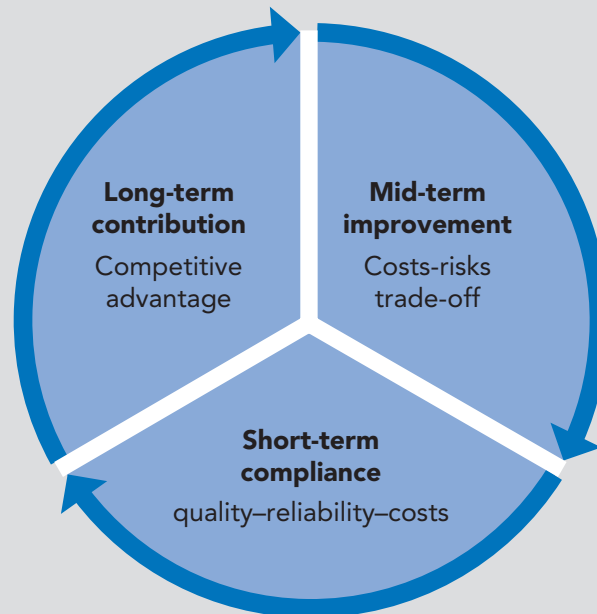
A typical new purchasing partnership starts with “contractual trust” and crystallises into “goodwill trust” in its mature stages (Sako, 1992).<sup>138</sup> According to de Hemmer Gudme (2017)<sup>139</sup>, three factors (Figure 16) determine purchasing partnerships. These are:

- long-term contribution;
- mid-term improvement;
- short-term compliance.

<sup>137</sup> Harrison, A. and Van Hoek, R. (2005), *Logistics Management and Strategy: Competing through the supply chain*, 2nd Ed. FT/Prentice Hall, p. 254

<sup>138</sup> Sako, M. (1992), *Prices, Quality and Trust*. Cambridge: Cambridge University Press

<sup>139</sup> de Hemmer Gudme, O. (2017), “A New Strategic Role for Purchasing: Business Partner for Value(s) Creation”, *Strategic Direction*, Vol. 33, Iss. 2, p. 29



Source: Adapted from de Hemmer Gudme (2017)

**Figure 16:** Factors in purchasing partnerships



“ Whether it is a desire to tap expertise globally to solve problems locally, a wish to respond faster to changing customer demands or a desire to develop and launch new products/services faster than the competition, a company’s partnering strategy and its design and execution must be inextricably linked. ”

Gadman and Cooper (2005)<sup>140</sup>

According to Brown, Boyett and Robinson (1994),<sup>141</sup> it is imperative that the focal organisation and its partner-supplier establish the “principles of partnership” as this has a direct and positive impact on “the volume, quality and timeliness of information exchange”.

### OVER TO YOU

#### Activity 9: A supplier partnership

Your friend Chang wants to adopt the strategy of selling own-brand breakfast cereals and ready meals at his supermarket because own-brand products earn a high profit margin. Chang also feels that the packaging of these products should be made from recyclable material. What type of supplier partnership would you recommend to Chang? Explain your answer.

140 Gadman, S. and Cooper, C. (2005), “Strategies for Collaborating in an Interdependent Impermanent World”, *Leadership & Organisation Development Journal*, Vol. 26, Iss. 1, p. 32

141 Brown, A.D. Boyett, I. and Robinson, P. (1994), “The Dynamics of Partnership Sourcing”, *Leadership & Organisation Development Journal*, Vol. 15, Iss. 7, p. 15






Partnership sourcing benefits both the focal organisation and the supplier. Some of these advantages are highlighted by Lysons (1996)<sup>142</sup> and are explained in Table 19.

The advantages of partnership sourcing	
To the focal organisation	To the supplier
<p><b>Purchasing advantage:</b> The focus shifts from negotiation and administration to improvement and quality assurance. Better planning is possible and certainty of supplies increases.</p>	<p><b>Marketing advantage:</b> Trust and stability lead to better planning. This gives confidence to invest and large orders improve commitment to fulfil buyer’s requirements.</p>
<p><b>Cost advantage:</b> This is brought about by the ability to reduce inventory, and greater control on logistics. Supplier participation in new products and spotting market trends are other positive outcomes.</p>	<p><b>Cost advantage:</b> Processes are simpler, and therefore, economical. Payments are certain. Cost reduction becomes a mutual goal of both parties. Customer planning leads to efficient logistics.</p>
<p><b>Strategic advantage:</b> Co-operative arrangements encompass “shared problem solving and access to supplier’s technology” for supply chain improvement.</p>	<p><b>Strategic advantage:</b> Supplier development results from customer’s investment in the key upstream stakeholders for an outcome-driven supply chain.</p>

Source: Lysons (1996)

**Table 19:** Benefits of partnership sourcing



“A meaningful partnership yields still further benefits for purchasers, notably in terms of the increased willingness of suppliers to agree to improve and update their products and services.”

Brown, Boyett and Robinson (1994)<sup>143</sup>

142 Lysons, K. (1996), *Purchasing*, 4th Ed. London: M&E Pitman Publishing, p. 255

143 Brown, A.D.; Boyett, I. and Robinson, P. (1994), “The Dynamics of Partnership Sourcing”, *Leadership & Organisation Development Journal*, Vol. 15, Iss. 7, p. 16

Lysons (1996) highlights three problems with partnership sourcing (see Table 20).

<b>Confidentiality</b>	When suppliers are also part of the rival's supply network
<b>Complacency</b>	When suppliers require close regulation on issues related to competitive price
<b>Contractual</b>	When, for economic or other reasons, forecasts require downward revision

Source: Lysons (1996)

**Table 20:** Problems with partnership sourcing



## Subcontracting

Subcontracting involves entering into a contractual agreement with an external organisation when the focal organisation cannot perform the activity. Bruel (2016)<sup>144</sup> classifies subcontracting into three types, as shown in Table 21.

Type of subcontracting	Reason	Example
Speciality subcontracting	Lack of either expertise or resources to perform activities.	A hospital subcontracts its in-house cafeteria to a specialist catering organisation.
Capacity subcontracting <ul style="list-style-type: none"> <li>• regular capacity</li> <li>• occasional capacity</li> </ul>	The focal organisation is not able to meet high demand from its own capacity.	A consumer electronics organisation subcontracts manufacturing of LED television to an external factory.
Offshore subcontracting	The need to achieve cost-efficiencies.	An airline subcontracts its data processing to a data centre located in a low wage country.

Source: Bruel (2017)

**Table 21:** Types of subcontracting



In many situations, the decision to subcontract increases the cost because of the subcontractor's margin. It also brings the risk of not getting the supply in the required time or of the desired quality (Slack, 1997).<sup>145</sup>

144 Bruel, O. (2016), *Strategic Sourcing Management: Structural and Operational Decision Making*, 1st Ed. Kogan Page

145 Slack, N. (ed.) (1997), *Encyclopedic Dictionary of Operations Management*

The decision to subcontract is further examined in the case study below.

Even though partnership sourcing is becoming a popular buyer-supplier arrangement, it has its drawbacks. One key drawback is the compromising of confidentiality. There is a risk of misuse of information and knowledge if the supplier is opportunistic or supplies to rivals also.

**REVISION**  
*on the go*

## CASE STUDY

### Subcontracting decision

Penguin Lamps manufactures two standard types of desk lamps, Type 1 and Type 2, that are manufactured on the same machines.

The budgeted demand for the next year is 4000 units of each type of lamp. The following information relates to manufacturing one unit of each lamp.



	Type 1 Lamps	Type 2 Lamps
Machine hours required per unit	3	2
Variable cost per unit	\$20	\$36

Only 16,000 machine hours will be available in the next year.

A sub-contractor has quoted unit prices for supplying the two types of lamps as:

Type 1: \$29

Type 2: \$40

Since there is a shortfall in machine hour, some units of one or both types of lamps will need to be sub-contracted if the company wants to meet the highest level of demand.

Product	Units	Machine hours required
Type 1 Lamps	4,000	12,000
Type 2 Lamps	4,000	8,000
	Required machine hours	20,000
	Available machine hours	16,000
	Shortfall	4,000

	Type 1 lamps (\$)	Type 2 lamps (\$)
Variable cost of making each lamp	20	36
Variable cost of buying each lamp	29	40
Extra cost of buying	9	4
Machine hours saved by buying	3 hours per unit	2 hours per unit
Extra variable cost of buying per hours saved	\$3	\$2

Since the extra variable cost for Type 2 lamps is lower than the extra variable for Type 1 lamps, it is cheaper to buy Type 2 lamps.

There are enough machine hours to make all 4000 units of Type 1 lamps and 2000 units of Type 2 lamps. Therefore, 4000 hours required for production of Type 2 lamps must be sub-contracted. From the figures in the table below, it is evident that with a mere \$8000 extra cost, Penguin Lamps is able to meet the higher level of demand for its lamps and meet the requirement of the market.

	Machine hours	No. of units	Unit variable cost \$	Total variable cost \$
Make Type 1 lamps	12,000	4,000	20	80,000
Make Type 2 lamps	4,000	2,000	36	72,000
Total	16,000			152,000
Buy Type 2 lamps (balance)	4,000	2,000	40	80,000
Total	20,000	8,000		232,000

## Outsourcing

### CASE STUDY: BRITISH AIRWAYS

#### Outsourcing: the trade-off between reputation and cost

“Every aspect of an airline’s operation is tethered to its mothership: the IT system” – Simon Calder

British Airways’ (BA) corporate website describes it as a “full-service, global airline”. The airline has a long heritage and is a well-known brand. It will complete 100 years of flying in 2019. As a result of its merger with Iberia in the past few years, BA is now a part of International Airlines Group (IAG). The airline has a fleet of more than 280 aircrafts that transport 40 million passengers to more than 170 destinations in 70 countries.



At the start of a long public holiday weekend in May 2017, British Airways had a worldwide computer systems (IT) failure. As a result, more than 650 BA flights were unable to take off from all major airports. Over 70,000 passengers were stranded worldwide at the airports, many of them having checked out of their hotels, while others were about to begin a holiday with their young children to overseas destinations. As the airline staff grappled with the IT outage, unsure of its cause or its probable duration, the airports got crowded. There were numerous complaints from passengers about the poor response from the airline and the absence of basic customer service such as provision of food and drinks while they waited for further information about their flights.

Initially, it was suggested that the outage was caused by power failure where the outsourced overseas IT services supplier was. Sue Roaf, professor at Oxford University, questioned the logic of outsourcing the “electricity-dependent function” to a supplier based in a country that had unreliable electricity, however, BA’s top management refuted that claim. Further investigation revealed that the outage was caused by human error that led to an electricity surge that damaged a data server at its data centre. The cost of this failure was estimated to be over \$120 million, most of it related to passenger compensation (hotel, transportation and food bills) under the European Union’s strict compensation regulations.

Sources: British Airways website, Sky News, The Times, The Daily Mail, The Financial Times, The Guardian

The premise of outsourcing has been discussed as a do or buy purchasing strategy. If the focal organisation assesses that superior performance will result from sharper strategic focus on “core competences and unique capabilities”, the case for outsourcing some of the operations activities becomes stronger (Lowson, 2002).<sup>146</sup>

In deciding to outsource, there is usually a trade-off between the cost advantage gained from a specialist supplier and the loss of control. The following three important questions need to be answered to determine if the outsourcing will deliver the desired outcome (Bruel, 2017; see Table 22).

What are the precise boundaries of the activity chosen for outsourcing?

What specific single or multiple benefits are expected from outsourcing?

What are the risks of outsourcing and what kind of risk mitigation is required?

Source: Bruel (2017)

**Table 22:** Questions to consider before outsourcing



Traditionally, many organisations have relied on external suppliers for some of the logistics activities such as transportation. However, in recent years, many western organisations have outsourced information and data processing, and even telephone and internet-based customer service, because of increased global connectivity from information technology and telecommunications, and a wide choice of service providers with a large pool of knowledge workers in low wage countries.

Outsourcing is defined as:

“*a management strategy by which major non-core functions are transferred to specialist, efficient, external providers.*”

Lysons and Farrington (2005)<sup>147</sup>

It is important to make a distinction between outsourcing and offshoring. Outsourcing is strictly a “buy” decision that involves domestic or overseas suppliers.

In-house offshoring means moving a part of operations to an overseas location in order to gain a cost or skill advantage. In this case, the focal organisation acquires its own assets to perform the activity.

“Offshore outsourcing” is when the focal organisation outsources its offshore activity to an external supplier. The organisation does not own any assets for the particular outsourced activity (Slack, Chambers and Johnston, 2010).<sup>148</sup>

“*Companies usually outsource development primarily because of the supplier’s capabilities, which are themselves an accumulation of specialist knowledge from working with a variety of customers.*”

Slack and Lewis (2011)<sup>149</sup>

146 Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*. Routledge, p.77

147 Lysons, K. and Farrington, B. (2016), *Procurement and Supply Chain Management*, 9th Ed. Pearson, p. 361

148 Slack, N., Chambers, S. and Johnston, R. (2010), *Operations Management*, 6th Ed. FT/Prentice Hall, p. 146

149 Slack and Lewis (2011), *Operations Strategy*, p. 271



## OVER TO YOU

**Activity 10: British Airways' decision to outsource its IT services**

- 1 Do you think that British Airways should revise or retain its buy strategy on IT services? Explain why.**
- 2 If British Airways had to choose between maintaining its reputation and gaining an advantage from cost efficiencies, which one should it choose?**

## READING LIST

- Freytag, P.V. and Mikkelsen, O.S. (2007), "Sourcing from Outside – Six Managerial Challenges", *Journal of Business & Industrial Marketing*, Vol. 22, Iss. 3, pp.187–195. (This article will be available in your online student resources.)
- Fung, P. (1999), "Managing Purchasing in a Supply Chain Context: Evolution and Resolution", *Logistics Information Management*, Vol. 12, Iss. 5, pp. 362–367. (This article will be available in your online student resources.)
- Kraljic, P. (1983), "Purchasing Must Become Supply Chain Management", *Harvard Business Review*, Sept. 1983 Issue
- Lysons, K. and Farrington, B. (2016), *Procurement and Supply Chain Management*, 9th Ed. Pearson
- O'Brien, J. (2015), *Category Management in Purchasing: A Strategic Approach to Maximise Business Profitability*, 3rd Ed. Kogan Page
- van Weele, A. (2009), *Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice*, 5th Rev. Ed. Cengage Learning

## Summary

- Purchasing is an integral part of every organisation's economic existence.
- Buyers purchase a variety of goods and services to achieve the operations objectives. These include raw materials, semi-manufactured materials and components, finished products, packaging, capital items and services.
- Purchases can also be classified according to the manner in which materials are bought: straight rebuy, modified rebuy, or new buy.
- Purchasing is a function responsible for obtaining (by purchase, lease, or other legal means) equipment, materials, supplies and services required for production.
- Many experts prefer to use the term procurement instead of purchasing, and treat it as a set of strategic activities proactively engaged with the dynamic supply market and responding to the market creatively in order to make a positive contribution to the focal organisation's performance.
- Purchasing becomes a sub-activity of the larger procurement function, and procurement is an integral sub-function of supply chain management.
- The attributes of contemporary purchasing (or procurement) are: proactive (rather than reactive), relational (rather than transactional) and strategic (rather than tactical).
- There are three phases in purchasing: the notification phase, the ordering phase and the post-ordering phase.
- The important documents involved in the process of purchasing are purchase requisitions, bill of materials, enquiry forms and purchase order forms.
- The evolution of purchasing into procurement happened as Michael Porter and Peter Kraljic developed influential frameworks.
- Porter put the spotlight on purchasing strategy, and brought it into the ambit of competitive strategy.
- Kraljic established the importance of integrating purchasing and supply chain management as businesses became exposed to intense rivalries caused by new entrants after deregulation.
- The extent to which procurement makes a strategic contribution to superior performance is determined by specific factors.
- Procurement becomes strategic for the focal organisation when a large volume of critical items is required at a competitive price in an uncertain or technologically fast-paced environment.
- Procurement is viewed as a strategic function as bought-out material makes up a substantial proportion of the product costs.
- Supplier assessment, selection and management are critical for obtaining high quality material at the right time, and supplier participation can be a catalyst for superior product design.
- Strategic procurement evaluates a number of aspects of critical supply chain decisions.
- There is a strong and direct link between purchasing efficiency and performance.
- Purchasing objectives involve fulfilment of five criteria: right price, right time, right quality, right quantity and right source.
- The generic purchasing objectives must be translated into specific objectives that represent corporate objectives.
- Contemporary purchasing (procurement) has a larger scope than traditional purchasing, as it strives to contribute to revenue by sourcing materials that have a positive effect on value creation.
- Kraljic's 2 × 2 matrix brings category management into the purchasing function, and sets in motion a strategic process that critically scrutinises all the materials and products an organisation purchases from external suppliers.
- Supplier preferencing is also a 2 × 2 matrix that maps the supplier's perceptions of the focal organisation on two dimensions: attractiveness to the supplier, and the supplier's dependency on the focal organisation.

- The two dimensions can be further classified into four categories: development, core, exploitable and nuisance.
- Supplier preferencing is important in managing supplier relationships because it gives the procurement function the suppliers' view on how strategically they treat the focal organisation.
- Supply strategy has three dimensions that result in effective procurement: extent of intervention required, type of intervention required, and the level at which intervention is required.
- The extent of intervention in supply strategy can be extensive, moderate or low.
- Purchasing strategies include: "do or buy" strategy, and single versus multi-sourcing.
- When an organisation pursues a "do" strategy, manufacturing is an in-house operation. A "do or buy" decision determines whether to make a particular component (or perform a particular service) or buy it from a supplier.
- Three key approaches influence do or buy decisions: operational cost-based approach, business approach and vertical integration.
- There are a number of sources that can help the focal organisation gain access to suitable suppliers. These include trade directories, Yellow Pages, databases, exhibitions and trade journals.
- The focal organisation can adopt a combination of supply arrangements based on three sets of alternatives: global versus local sourcing, single versus multi-sourcing and partnership versus competitive bidding.
- Tendering is a purchasing procedure whereby potential suppliers are invited to make an organisation an unequivocal offer of the price and terms, which, on acceptance, shall be the basis of a subsequent contract.
- Two factors underpin the focal organisation's assessment and selection of suppliers: the extent to which the focal organisation creates value by itself, and the extent to which value can be created in relationships with suppliers.
- Assessing and selecting suppliers is not a straightforward task, as the decision involves trade-offs because the degree of superiority between suppliers is mostly small.
- The focal organisation may decide to assess and select a new supplier based on qualitative factors such as capability demonstrated in the prior experience of the supplier's executive team.
- Single-sourcing is the practice of obtaining all of one type of input product, component or service from a single supplier.
- Multi-sourcing is the practice of obtaining the same type of product, component or service from more than one supplier in order to maintain market bargaining power or continuity of supply.
- Single-sourcing and multi-sourcing have their advantages and disadvantages.
- Partnership sourcing (also called "purchasing partnerships" or "supplier partnerships") is the focal organisation's strategic response to manage margins in the fast-moving, hyper-competitive environment.
- Four key features of partnership sourcing are: shared goals, mutual benefit, trust and information sharing and long-term commitment.
- Three factors that determine purchasing partnerships are: long-term contribution, mid-term improvement and short-term compliance.
- Partnership sourcing benefits both the focal organisation and the supplier in terms of purchasing, cost and strategic advantages.
- There are confidentiality, complacency and contractual problems associated with partnership sourcing.
- Subcontracting involves entering into a contractual agreement with an external organisation when the focal organisation cannot perform the activity.



- Subcontracting can be of three types: speciality subcontracting, capacity subcontracting and offshore subcontracting.
- Outsourcing is a management strategy that transfers major non-core functions to specialist, efficient, external providers.
- In making a decision to outsource, there is usually a trade-off between cost advantage gained from specialist supplier and loss of control.
- Outsourcing is strictly a “buy” decision that involves domestic or overseas suppliers. In-house offshoring means moving a part of operations to an overseas location.

# Chapter 4

# Logistics Management

## Introduction

Logistics has a long history and military origins. According to the Merriam-Webster dictionary, logistics means “the handling of the details of an operation”. When logistics unfolds in operations, the details of the operation take the shape of physical movement of material and products, including inbound transportation, handling, storage and outbound distribution. In the context of supply chains, in which agility is the key determinant of competitive advantage, logistics is no longer a static support function but a dynamic and strategic managerial activity. In this chapter, you will understand the meaning and significance of logistics function and logistics management, and learn about three specific areas of logistics (warehousing, transportation and stock).

## Learning outcome

On completing the chapter, you will be able to:

### **4 Analyse the role of logistics and logistics management**

## Assessment criteria

### **4 Analyse the role of logistics and logistics management**

- 4.1 Discuss the meaning of logistics
- 4.2 Analyse organisational logistics management considerations

# Level 5 Operations Management

## 4.1 The meaning of logistics

### Definitions of logistics

The concepts of logistics and supply chain cannot be separated, as logistics management is a sub-function of supply chain management. However, the core idea of logistics has its origins in military operations. Since physical movement is an integral property of logistics – and no organisation has all the resources to move goods over great distances – logistics management is an inherently network-led function. It is relevant to view the themes of supply chain management and logistics management from a military perspective. The statement below is an example.

“*The shift from viewing actors as independent to viewing them as part of a continuously adapting ecosystem.*”

*Cebrowski and Garstka (1998)<sup>150</sup>*

Logistics is also often referred to as physical distribution. It is a “**flow-oriented**” concept, a “pipeline that extends from supplier to final customers” (Christopher, 2005)<sup>151</sup>. If we visualise a supply network as human body, and the vital organs in the human body as organisations linked to each other, then logistics would be the blood vessels (that supply oxygen) and nerves (that send information). However, the similarity ends there because logistics is not universal, as every organisation has its own unique logistics (but all human bodies essentially function in the same way). In other words, the way in which material and information flows is different for each organisation.

### CASE STUDY: H&M

#### An overview of supply chain and logistics

Hennes & Mauritz AB (H&M) is a Swedish company, whose core business is clothing and fashion accessories for women, men and children. The organisation operates 4,351 stores in 64 markets. More than 30 of these markets are also served by H&M e-commerce. The company’s mission is to “offer fashion and quality at the best price in a sustainable way.”



<sup>150</sup> Cebrowski, A.K. and Garstka, J.J. (1998), “*Network-centric Warfare: Its Origin and Future*” [online]. Retrieved from: [http://www.kinnection.com/ncoic/ncw\\_origin\\_future.pdf](http://www.kinnection.com/ncoic/ncw_origin_future.pdf) [Accessed on 25th September 2017]

<sup>151</sup> Christopher, M. (2005), *Logistics and Supply Chain Management: Creating Value Adding Networks*. 3rd Ed. Prentice Hall/Financial Times, p. 95

H&M's operations does not include production. Instead, it sources its products from a network of 790 independent suppliers, located in Asia and Europe, who manufacture clothes for H&M using "organic cotton and recycled polyester", thus making H&M one of the largest consumers of these raw materials.

Since production is outsourced, the core activities in H&M's operations include in-house design (carried out by a team of more than 150 designers) and supply chain management. H&M is in the business of "fast fashion", and therefore they focus on creating a responsive and agile supply chain.

H&M does not have its own fleet of vehicles, so it purchases transport services from external service providers. Therefore, logistics management is also an important activity in the organisation's operations. Since the supply network is global, many modes of transportation are used. Sea and rail are the primary modes, but road and air are also used.

The flow of goods is from the suppliers' factories to the company's distribution centres, and then to "stores and/or to regional replenishment centres". H&M is adopting the latest technology in its warehouses.

To achieve the best results, H&M places a significant emphasis on supply chain management. Suppliers are managed through H&M's production offices that are located in the same countries as suppliers. These offices focus on order processing and aim to place each order "with the right supplier", safeguard the right price and good quality in its purchasing decisions, and ensure timely deliveries of products.

Source: Adapted from H&M Annual Report (2016), Ho (2014) and Arrigo (2016)

## OVER TO YOU

### Activity 1: H&M

- 1 What vertical integration strategy does H&M adopt for production and logistics?
- 2 How does H&M manage its suppliers?

Logistics is defined as:

**“** the process of strategically managing the procurement movement and storage of materials, parts and finished inventory (and the related information flows) through the organisation and its marketing channels in such a way that current and future profitability are maximised through the cost-effective fulfilment of orders. **”**

Christopher (2005)<sup>152</sup>

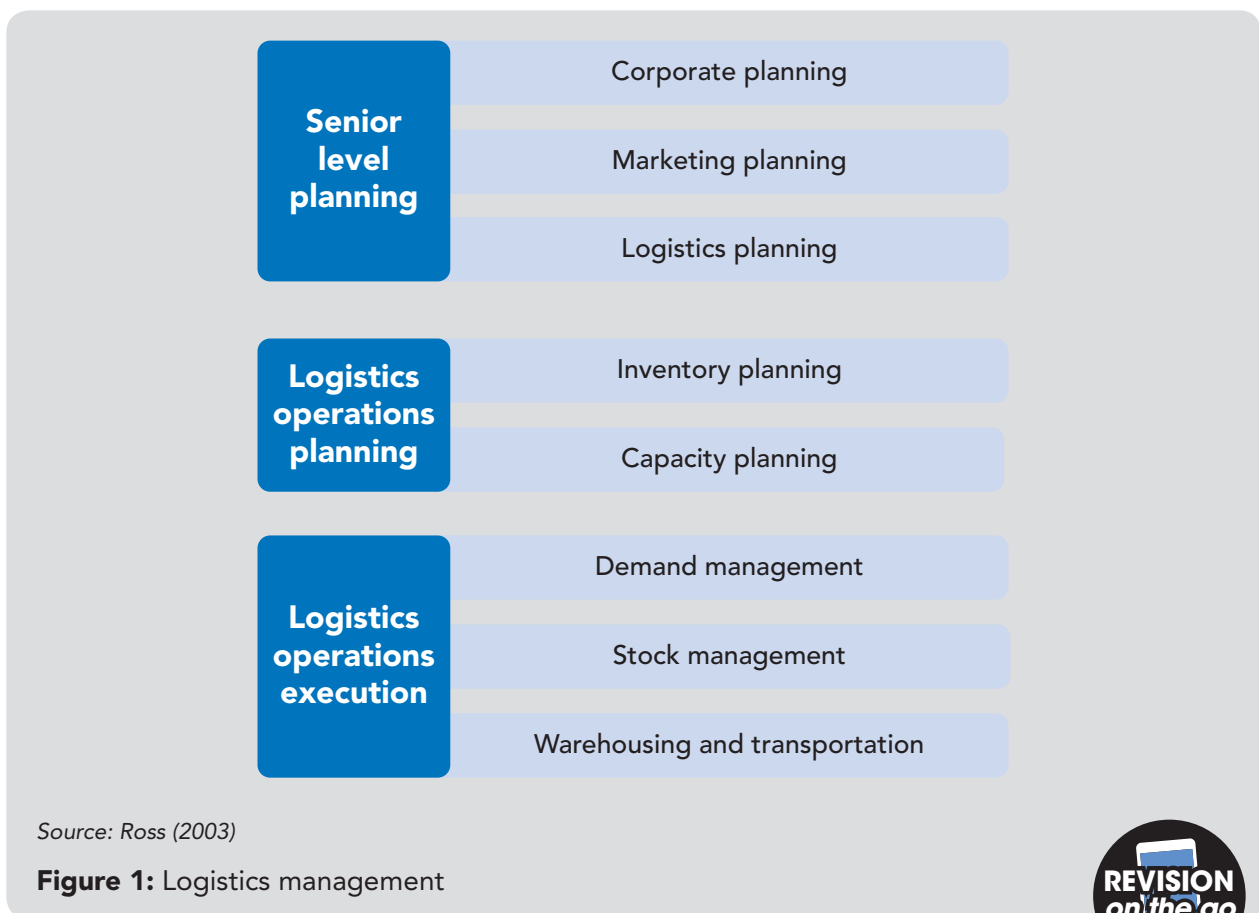
<sup>152</sup> Christopher, M. (2005), *Logistics and Supply Chain Management: Creating Value Adding Networks*. 3rd Ed. Prentice Hall/Financial Times, p. 4

Logistics management is the managerial activity that aims to get the best outcome from logistics. Effective logistics management focuses on corporate goals, is aligned with corporate strategy and is designed flexibly to respond to the changing environmental forces (Min and Keebler, 2000)<sup>153</sup>, as illustrated in Figure 1.

Logistics management is defined as:

“that part of supply chain management that plans, implements, and controls 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 customers’ requirements.”

The Council of Supply Chain Management Professionals (CSCMP) (2017)<sup>154</sup>



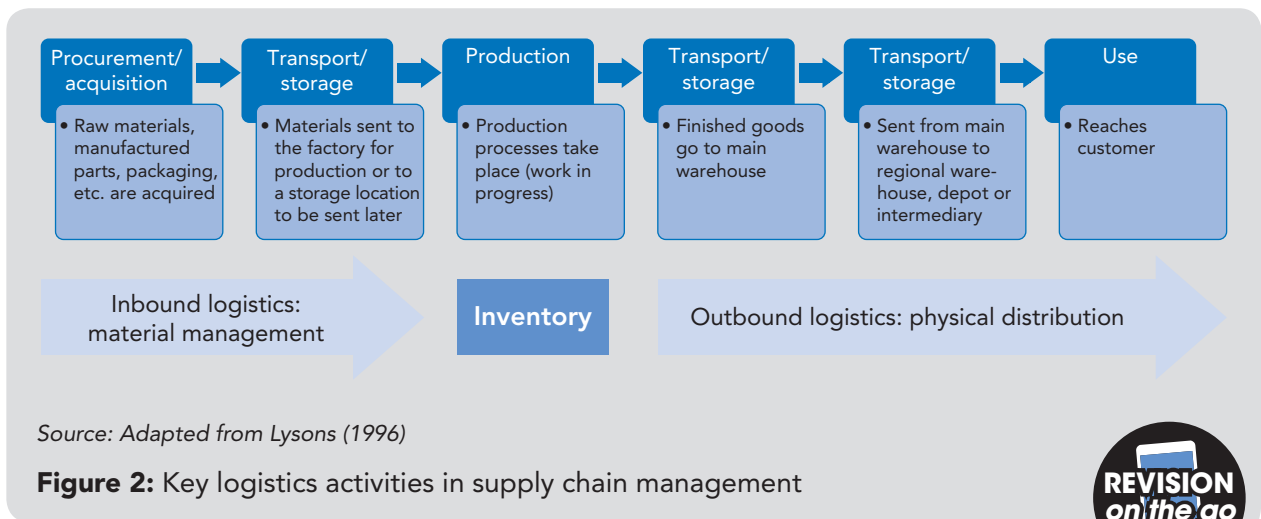
## The logistics function

Logistics is a broad term for a set of activities (see Figure 2) without which a functional pipeline within the supply chain is not possible. The explanation of some of the key logistics activities (Ross, 2015)<sup>155</sup> is presented in Table 1.

153 Min, S. and Keebler, J.S. (2001), "The Role of Logistics in Supply Chain", in Mentzer, J.T. (ed.), *Supply Chain Management*: Sage Publications

154 CSCMP Website (n.d.), "Council of Supply Chain Management Definitions and Glossary. CSCMP" [Online]. Retrieved from: [http://cscmp.org/CSCMP/Educate/SCM\\_Definitions\\_and\\_Glossary\\_of\\_Terms/CSCMP/Educate/SCM\\_Definitions\\_and\\_Glossary\\_of\\_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921](http://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921) [Accessed on: 25 September 2017]

155 Ross, D.R. (2015), *Distribution Planning and Control: Managing in the Era of Supply Chain Management*, 3rd Ed. Springer, p. 7



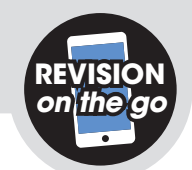
**Figure 2:** Key logistics activities in supply chain management



<b>Inbound and outbound transportation management</b>	<p>Two focus areas of this activity are routing and scheduling so that “shipping capacity utilisation is optimised and less-than-truckload (LTL) shipments are minimised or eliminated”.</p> <p>Movement of goods is never separated from administration and documentation, especially when goods move across borders. Shipment documentation is an important responsibility of the logistics team. Non-compliance can lead to losses arising from fines and confiscation of goods.</p> <p>Transportation that relies on third-party service providers is successful only when the suppliers have been chosen carefully.</p>
<b>Fleet management</b>	<p>When the focal organisation operates its own fleet of vehicles, the logistics task is to balance optimum use and service levels.</p>
<b>Warehouse management</b>	<p>This has a direct impact on inventory management and appropriate movement of goods. The specific tasks include efficient “inventory storage, material handling, labour and equipment utilisation”, load consolidation, trans-loading or cross-docking, logistic postponement, reverse logistics.</p>
<b>Order management</b>	<p>The aim of logistics is to meet customers’ requirements effectively and efficiently, which is the key focus of order management. The tasks involve careful scrutiny of the customer’s order so that the shipment can be executed according to the “quoted lead times, order quantities and quality specifications.”</p>

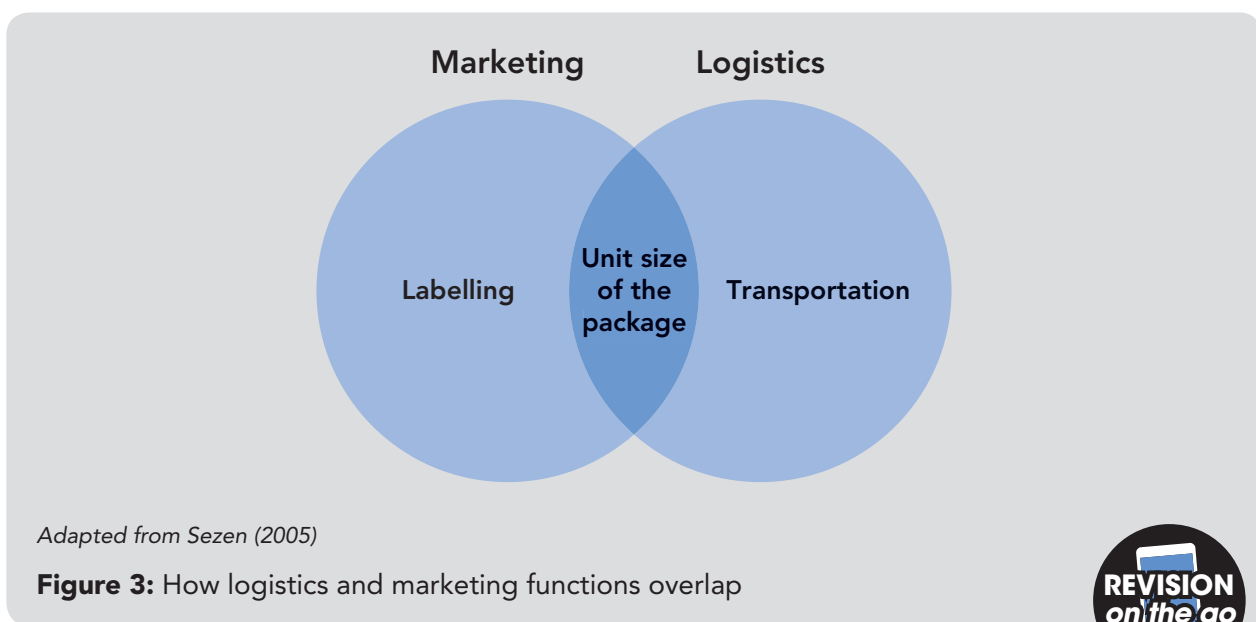
Source: Ross (2015)

**Table 1:** Some important logistics activities



Some other important logistics activities are logistics network design, supply-demand forecasting and third-party logistics service management. Other activities that comprise logistics to a lesser degree are “production planning and scheduling, packaging and assembly, and customer service”. The logistics function aims to co-ordinate and optimise all activities under the logistics umbrella, while maintaining a smooth exchange of information from other organisational functions such as production, marketing and finance. Information technology plays a critical role in this co-ordination, enabling logistics to meet the objectives of both operations and the focal organisation (CSCMP, 2017).<sup>156</sup>

Co-ordination between logistics and other organisational functions is essential for smooth operations. One example of this co-ordination is shown in Figure 3. The diagram illustrates that “labelling” is the responsibility of the marketing function, and “transportation” is the responsibility of logistics. However, “unit size of the package” is an overlapping decision, and should be co-ordinated to eliminate problems related to material handling, transportation or storage (Sezen, 2005).<sup>157</sup>



According to Sezen parameters for evaluating logistics performance are:

- Logistics costs
- Availability of product in the market
- Efficiency in inventory management
- Delivery (time and quantity)

### ! NEED TO KNOW

The key activities included in the logistics function are: inbound and outbound transportation, transport fleet management, warehouse management, order management.

The scope of logistics activities can also include production planning and scheduling, packaging and assembly, and customer service.



<sup>156</sup> CSCMP (n.d.), “Council of Supply Chain Management Definitions and Glossary” [Online]. Retrieved from: [http://cscmp.org/CSCMP/Educate/SCM\\_Definitions\\_and\\_Glossary\\_of\\_Terms/CSCMP/Educate/SCM\\_Definitions\\_and\\_Glossary\\_of\\_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921](http://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921) [Accessed on: 25 September 2017]

<sup>157</sup> Sezen, B. (2005), “The role of logistics in linking operations and marketing and influences on business performance”, *Journal of Enterprise Information Management*, Vol. 18 Issue: 3, p. 351

 OVER TO YOU

**Activity 2: Co-ordinating logistics**

Thinking about Figure 3, write down other important activities in operations that require close co-ordination between logistics and marketing functions.

## The strategic importance of effective organisational logistics

Three reasons that make logistics a strategic function in the supply chain management are explained in Table 2.

<b>Competition</b>	In the current competitive landscape, time and quality determine how well the focal organisation competes against its rivals (Min and Keebler, 2000). <sup>158</sup>
<b>Costs</b>	The costs of production have been decreasing, but logistics costs have been rising (Lowson, 2002), <sup>160</sup> so if logistics is managed well, efficiency and productivity are enhanced, a significant decrease in unit costs is obtained, and consequently, the focal organisation gains a competitive advantage (Christopher, 2005). <sup>161</sup>
<b>Internationalisation (as a result of globalisation)</b>	The logistics pipeline is getting longer and spans many national borders with disparate infrastructures. This creates challenges for timely deliveries (Harrison and Van Hoek, 2005). <sup>162</sup>

**Table 2:** Why logistics is a strategic function



158 Min, S. and Keebler, J.S. (2001), "The Role of Logistics in Supply Chain", in Mentzer, J.T. (2001) *Supply Chain Management*. Sage Publications

159 Lowson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*: Routledge

160 Christopher, M. (2005), *Logistics and Supply Chain Management: Creating Value Adding Networks*, 3rd Ed. FT/Prentice Hall, p.8

161 Harrison, A. and Van Hoek, R. (2005), *Logistics Management and Strategy: Competing through the supply chain*, 2nd Ed. FT/Prentice Hall



“Logistics activities have a major impact on the capabilities and profitability of the supply chain and its member organisations.”

Min and Keebler (2000)<sup>162</sup>

It is evident from the definition that there are several dimensions of logistics, and each dimension has a cost. Most of these costs are a result of the intermediary service providers in the logistics pipeline, and together affect the price paid by the end-consumer. It is, therefore, imperative that the end-consumer should have a positive perception of the role that the intermediary processes and activities play in creating value (Min and Keebler, 2000).

The total logistics costs (Christopher, 1985 in Lawson, 2002)<sup>163</sup> are the sum of:

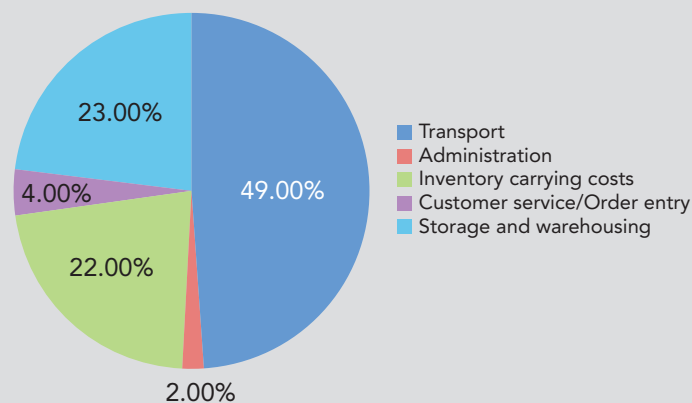
- inbound and outbound transportation costs;
- facilities costs that include warehousing, distribution centres, and handling equipment;
- inventory costs;
- material handling costs;
- packaging costs;
- administration costs for order processing and invoicing;
- managerial costs.

The triggers that make logistics a strategic sub-function in operations are: competition, costs and globalisation.



The importance of these logistics costs to the supply chain managers in the USA has emerged from a 2011 survey, the results of which are shown in Figure 4.

**Importance of logistics costs for the US managers**



Source: Rushton, Croucher and Baker (2014)

**Figure 4:** Importance of logistics costs



<sup>162</sup> Mentzer, J.T. (2004), *Fundamentals of Supply Chain Management: Twelve Drivers of Competitive Advantage*. Sage Publications

<sup>163</sup> Christopher, M. (1985), in Lawson, R.H. (2002), *Strategic Operations Management: The New Competitive Advantage*. Routledge

## Trends in logistics

Coyle et al. (2010)<sup>164</sup> describe the growing practice of outsourcing logistics to external organisations. Termed as third-party logistics (TPL or 3PL) providers, these organisations specialise in the management and flow of goods. There are many benefits of buying 3PL services rather than doing them in-house:

- the focal organisation reduces the cost of logistics activities because 3PL providers enjoy economies of scale, and can therefore offer a competitive price to their customers;
- the focal organisation can focus on and invest resources in other strategic areas, while managing 3PL through competent managers without building large-scale physical assets (p.398).

Many organisations that have traditionally earned revenue from package delivery/courier services or shipping have expanded the scope of their business to offer a comprehensive logistics solution “where customers can purchase all their transportation service needs, regardless of mode or geographic requirements.” Examples include DHL, FedEx, UPS and Maersk (p.398).

Reverse logistics involves accepting goods from the customers (e.g. when goods are damaged, obsolete or unacceptable to the customer), and is becoming an important activity in the logistics function of many large-scale retailers. Reverse logistics differs from conventional “forward logistics” in terms of the location and capacity of the facilities (Coyle et al., 2010).



### OVER TO YOU

#### Activity 3: Reverse logistics

- 1 List three large retailers in your country that have an explicit “returns policy”.**
- 2 For each one, explain their warehousing and reverse logistics activities.**

<sup>164</sup> Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning

## Logistics strategy

### CASE STUDY: PHILIPS-ÉCLAIRAGE

#### Differentiation strategy

Philips-Éclairage's logistics strategy aims to offer distinct value to its customers. The organisation has made a large investment in location and automation at its central warehouse. The location is in the heart of Paris, and technology allows it to meet the requirements of its customers (wholesalers) on a daily basis. The customers benefit from reduced cost of holding stock and Philips-Eclairge benefits from their loyalty.



Source: Adapted from Fabbe-Costes and Colin (2007)

Logistics strategy is the link between corporate strategy, production and distribution. According to Lambert (1998),<sup>165</sup> a company's logistics strategy needs to be designed with full consideration of the company's basic strategy and the costs required to change that strategy. Two physical facilities that are deployed to execute a logistics strategy are transportation and warehousing. Like other functions' strategies, a logistics strategy aims to contribute to the focal organisation's competitive advantage. Ross<sup>166</sup> highlighted some of the ways in which this is achieved, as explained in Table 3.

### OVER TO YOU

#### Activity 4: Logistics services

**Identify three companies in your country that specialise in offering logistics services (transportation and/or warehouse) to large companies and importers.**

<sup>165</sup> Lambert, D.M.; Stock, J.R. and Ellram, L.M. (1998), *Fundamentals of Logistics Management*. McGraw-Hill: International Edition

<sup>166</sup> Ross, D.F. (2003), *Distribution Planning and Control*. Kluwer Academic Publishers

Strategy	Example	Advantage
Locate “supply points” close to the key customer	A warehouse located near the customer’s manufacturing can quickly respond to customers’ requirements, as could a distribution centre close to retail outlets.	Location advantage, “lock-in” advantage
Use technology to track customers’ stock requirements	Electronic Data Interchange (EDI) can cut down administration costs of the purchase order process and reduce lead times through direct replenishment of stock.	Differentiation advantage
Adopt third-party logistics, buy services	Build the organisation’s capabilities in logistics management skills rather than invest in facilities and physical assets related to logistics. Buy logistics from third party suppliers to reduce overheads related to warehousing and transportation.	Cost advantage

Source: Ross (2003)

**Table 3:** Dimensions of logistics strategy



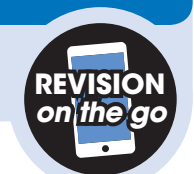
## OVER TO YOU

### Activity 5: Logistics strategy

**Write down three advantages of having a logistics strategy.**

## NEED TO KNOW

For effective performance, the logistics strategy must be aligned with the organisation’s business strategy and corporate strategy.



## 4.2 Organisational logistics management considerations

### CASE STUDY: SIGNIFICANCE OF TRANSPORTATION

#### Transport preserves economic value of goods

Aisha is based in Malawi. In July 2015, she opened a small supermarket in her newly purchased 1,200 square metre facility. This was the first of this kind of shop in her small town that had mostly convenience stores. Christmas was five months away and Aisha planned to sell synthetic Christmas trees and tree decorations during the festive season. The supplier in her country was a wholesaler who imported these goods from China. One of Aisha's friends suggested to her that, given the quantity that Aisha wanted to stock and sell, it would be much cheaper if she sourced a suitable Chinese supplier over the internet and ordered a shipment.



After doing her research, Aisha approached four suppliers located in China's Guangzhou region. She selected one supplier and negotiated the price and terms of delivery, then placed the international purchase order in the second week of October 2015. Her order was for 200 synthetic Christmas trees, and 2000 tree decoration pieces comprised of various glass, resin, plastic and metal decorative objects. The total purchase order value was US\$7000. The international shipment was "**Free on board (FOB) shipping point**" and was to be delivered as a sea cargo at the nearest port, and then by truck to her shop. The estimated delivery time was 30 days.

As the container ship approached the African coast, it was hijacked by pirates in the Indian Ocean. The negotiations for the release of the ship took 30 days. It was mid-December and people were already finishing their Christmas shopping, but Aisha did not yet have her items. When the cargo arrived in January, most of the goods were damaged, and Aisha could salvage only some of the consignment. As Christmas was already over, there were no customers for the decorations. She stored the stock in the small warehouse at the back of her supermarket.

Aisha had lost the opportunity to earn a healthy profit because of the lost sales, and also incurred the cost of storing the salvaged stock. She initiated an insurance claim.

### Transport options/modes

Transportation is the foundation of a supply chain. Even though the transportation costs make up less than 4% of the product's landed cost, the costs incurred in getting raw material supplies to the production facility or getting finished goods to the retail shelves or customers' doorsteps has a direct effect on profitability (Coyle et al. 2010).<sup>167</sup>

Transportation is about mobility within the supply chain. Transportation accomplishes two important physical tasks in the logistics pipeline:

- movement of material and products;
- storage of material and products.

<sup>167</sup> Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning

“Transportation is the function of planning, scheduling, and controlling activities related to mode, vendor and movement of inventories into and out of an organisation.”

APICS in Ross (2015)<sup>168</sup>

According to Min and Keebler (2001),<sup>169</sup> transportation is critical for “commercial life” because it links the “components of a supply chain’s complex functional structure and extensive global geographical structure”, and so becomes the most important accessory of the marketing mix (i.e. product, price, place, promotion). Without transportation, the focal organisation cannot carry through the “product” and “place” aspects of this marketing mix.

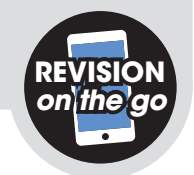
Multiple modes of transportation are available to move raw material and finished products, including, road (trucks), railroad (freight trains), air (cargo airplanes), water (container ships) and pipelines. Transportation of a product can be single mode or multimode. The data on shipment by transportation mode for the USA (refer to Figure 5) gives an indication of how the weight is moved, and the share that each mode takes in this movement.

According to Coyle et al. (2010),<sup>170</sup> the significance of transportation in supply chain and logistics management comes from its ability to create three fundamental utilities, which each help to preserve the product’s economic value. These three utilities are explained in Table 4.

Utility created by transportation	Significance
Place utility	Transportation efficiency affects the price of the product when it reaches the market. More efficient transportation allows the focal organisation to sell the products at a better or more competitive price. Example: If food items arrive on the supermarket shelves closer to their use-by (expiry) date because of inefficient transportation, they cannot be sold at market price.
Time utility	Efficient transportation directly affects the ability of the focal organisation to meet the demand, particularly for goods that have occasion-led demand. If raw materials are not delivered to meet production lines at their full capacity, or products do not arrive on time to “catch” the “rush” of customers, they have no economic value. Example: Christmas tree decorations, special sweets for Eid or “dijas” (clay lamps) for Diwali have reduced economic value if they are delivered after the festival.
Quantity utility	Appropriate transportation methods ensure that the quantity delivered matches the quantity demanded. Transportation that is not well designed can damage items, so that the focal organisation does not receive the quantity they ordered. This leads to economic loss either due to stock-out or lost sales. Logistics managers need to thoroughly evaluate and select transport carriers to be sure that they have the necessary equipment to deliver the right quantity.

Source: Coyle et al. (2010)

**Table 4:** Three utilities created by transportation



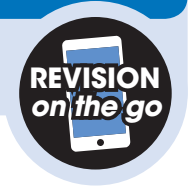
168 APICS in Ross, D.R. (2015), *Distribution Planning and Control: Managing in the Era of Supply Chain Management*, 3rd Ed., Springer, p. 110

169 Min, S. and Keebler, J.S. (2001). “The Role of Logistics in Supply Chain”, in Mentzer, J.T., ed. (2001), *Supply Chain Management*, pp. 246–248: Sage Publications

170 Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning

**! NEED TO KNOW**

Transportation gives economic value to the goods by creating place utility, time utility and quantity utility.



**📄 CASE STUDY: LOGISTICS IN AMERICA**

**Domestic movement of goods in the US economy**

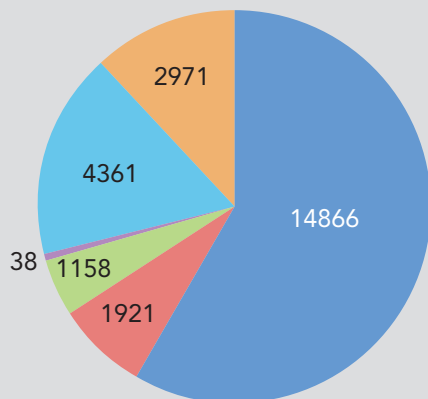
Movement of raw material and finished goods in the USA takes place in an infrastructure network that is comprised of roadways, railways, waterways, airways and pipelines. The distance the products have to be moved influences how the products will be moved (i.e. which modes and whether a single mode or multiple modes of transportation will be used). Multimodal transportation is growing fast due to the emergence of global supply chains.



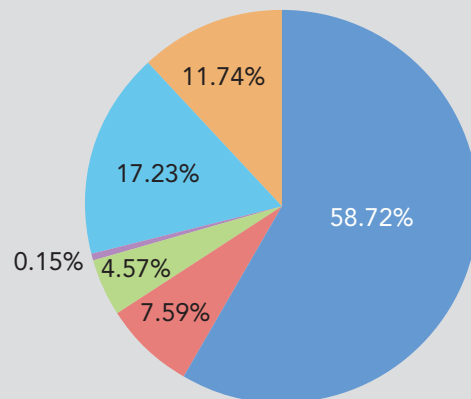
Road transport – mainly via different types of trucks – moves more than 60% of the weight and value of goods. In comparison, air transport accounts for a very small percentage, mainly because of the high cost per kilogram to transport good by air. The collective average value-to-weight for road, railroad, water and pipeline is just US\$1,100 per tonne, but in excess of US\$100,000 per tonne for air transport.

Source: Adapted from US Bureau of Transportation Statistics website

**Shipment by transportation mode (2015) (USA) (millions of tons)**



**Shipment by transportation mode (2015) (USA) (% of freight weight)**



- Truck
- Rail
- Water
- Air & Air + Truck
- Pipeline
- Multimode and Mail

Source: Adapted from US Bureau of Transportation Statistics (2017)

**Figure 5:** Shipment by transportation mode USA



“*Intermodal transportation combines the use of two or more of the basic modes to move freight from its origin to destination...there is evidence that it is growing.*”

(Eshkenazi, 2012)<sup>171</sup>

In current logistics systems (Coyle et al., 2009)<sup>172</sup>:

- international logistics pipelines require intermodal transportation;
- each mode has a unique “economical and technical structure”;
- each mode has a unique “quality of link service”;
- third-party transportation service providers serve the focal organisation with multiple capabilities.

The advantages and drawbacks of various modes of transportation are shown in Table 5.

Mode	Advantages	Drawbacks and challenges
Trucks	Flexibility in terms of types of commodities and shipment sizes. Ideal for last mile delivery. Logistics service can be customised to meet customer’s requirements. Fast-moving feeder in intermodal transportation.	Intense competition, escalating costs and inability to recover costs when capacity exceeds demand (e.g. during a recession). Relatively expensive for long distance movement of high volume, low value goods.
Railroad	Good for long distance movement of “basic, low value goods” that are required by customers in large quantities. Growing as a mode in the intermodal movement of finished goods.	Inflexible in terms of routes and timings. Not designed for last mile and short distances. Does not provide high level of protection to finished goods unless used with shipping containers. Vulnerable to theft and losses.
Air	Ideal for time-definite delivery of “small quantity of free-moving, low weight semi-finished and finished goods”. Carriers can earn a relatively higher margin on shipments.	High capital investment, and high variable costs. Not designed for last mile and short distances. Requires strict weight and volume specifications.
Water	Good for moving low value, high density and large quantity material. Has evolved as a sophisticated, standardised and versatile mode capable of handling diverse goods (e.g. “containerised” high value items) economically.	High capital investment, and high variable costs. Inflexible in terms of routes and timings. Not designed for last mile and short distances. Requires well-developed infrastructure and advanced equipment for handling shipments. Vulnerable to theft and losses.
Pipeline	Ideal for highly viscous and free moving raw material and utilities in liquid or gaseous form. Low variable costs.	Limited to certain kinds of material. For-hire pipeline is uneconomical for infrequent product movement because fixed costs are high.

Source: Coyle et al. (2013)

**Table 5:** Advantages and drawbacks of modes of transportation



171 Eshkenazi, A. (2012), “A World View on Supply Chain and Procurement” [Online]. Retrieved from: <http://www.apics.org/apics-for-individuals/apics-magazine-home/magazine-detail-page/2012/12/07/a-world-view-on-supply-chain-and-procurement> [Accessed on 25 September 2017]

172 Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning





## OVER TO YOU

**Activity 6: Transportation**

What is the single most important factor in the growth of multimode transportation?



## OVER TO YOU

**Activity 7: Modes of transportation**

- 1 Access the US Bureau of Transportation Statistics at:  
[https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/transportation\\_statistics\\_annual\\_report/2016/chapter\\_3](https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/transportation_statistics_annual_report/2016/chapter_3)
- 2 Identify and write down the examples of products that extensively use the air transport mode.
- 3 Which mode of transport is projected to grow the fastest by 2045 in terms of the value of goods moved?
- 4 What kind of growth is projected for multimode transportation between 2015 and 2045?

## Factors influencing transportation choice

The job of a logistics manager is to evaluate the following for each transport mode (carrier):

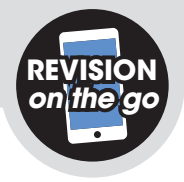
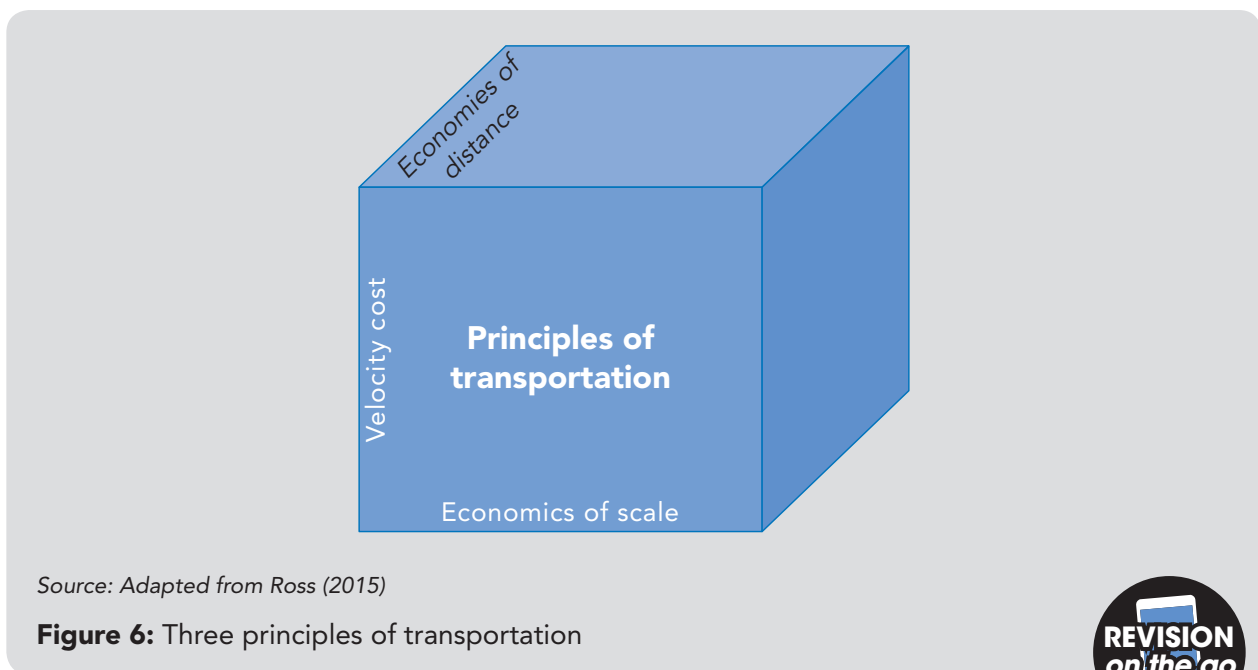
- volume and type of freight handled;
- cost structure.

Ross (2015)<sup>173</sup> highlights three principles that govern transportation planning. These are explained in Table 6 and shown in Figure 6.

<b>Economies of scale</b>	Larger shipments result in lower cost per unit weight. For example, the cost per kilogram in a full truckload (TL) of material is less than the cost of less-than-truckload (LTL).
<b>Economies of distance</b>	Termed as the “long haul economies”, this refers to the fact that shipments that travel greater distances cost less per kilogram-kilometre because certain costs associated with the movement (e.g. landing charges and sea port charges) do not alter with distance.
<b>Cost of velocity</b>	In a pipeline, there is a direct relationship between velocity of movement and cost. Less time in transit – associated with movement by air – results in higher costs. However, speed compresses time, and this can have a positive effect on revenue if organisations “exploit time to create competitive advantage”.

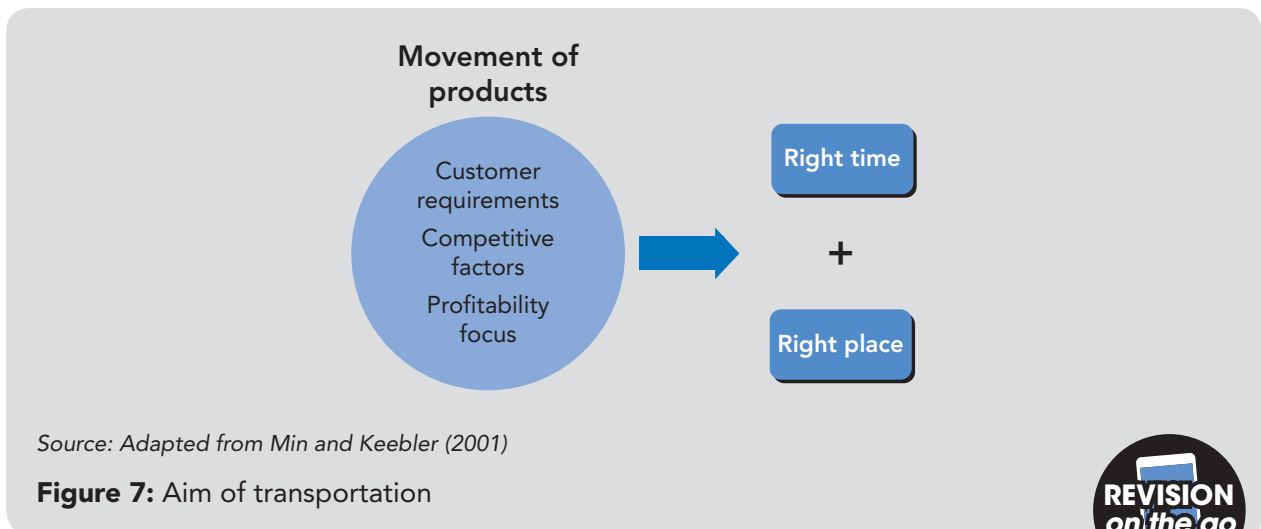
Source: Ross (2015)

**Table 6:** Three principles of logistics

173 Ross, D.R. (2015), *Distribution Planning and Control: Managing in the Era of Supply Chain Management*, 3rd Ed. Springer, p. 690

A coherent transportation strategy makes a positive contribution to the achievement of supply chain objectives because transportation consumes “temporal, financial and environmental resources”. Therefore, one of the key determinants of transportation is that it should take place only if the product value is enhanced by movement (Bowersox and Closs 1996). The aim should always be to get the products at the right place at the right time (see Figure 7).



Source: Adapted from Min and Keebler (2001)

**Figure 7:** Aim of transportation



## Transport issues, considerations and risks

Transportation risks are similar to any other supply chain risks, in that they are disruptive. Just like natural disasters or political upheavals, transportation failure causes delay in deliveries, leads to loss by damage or theft in transit, and, as a result, ends in quantitative and qualitative loss for the organisation. Transportation risk is defined as:

*“ a future freight movement event with a probability of occurrence and the potential for impacting supply chain performance. ”*

Coyle et al. (2010)<sup>174</sup>

Coyle et al. (2010) mention various transportation risks shown in Table 7.

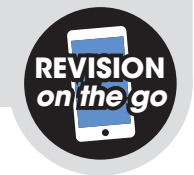
Product loss	Product damage	Product contamination	Delivery delay
Due to theft or negligence. The damage can be far greater than the monetary value of goods lost, as there is a risk of damaging the organisation’s reputation.	Due to improper physical handling. Monetary gain cannot be expected from damaged goods. There is also an administrative cost associated with claims.	Due to natural or man-made factors while goods are in transit and out of control. Can result in bad press if not detected and contained.	Often due to complex and dispersed supply network. Disrupts production, and lowers productivity, leading to financial loss.

174 Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning

Product loss	Product damage	Product contamination	Delivery delay
Examples			
Product theft	Equipment accidents	Climate control failure	Congestion
Shipment jettison	Poor freight handling	Product tampering	Poor weather
Piracy and hijacking	Faulty equipment loading	Contaminants	Equipment malfunction

Source: Coyle et al. (2010)

**Table 7:** Transportation risks



### Managing transportation risks

Transport risk management is a subset of generic risk management. Its key objective is to mitigate threats and failures arising from any disruption in the movement of raw material or goods that can lead to operational seizure and/or financial loss (Coyle et al., 2010).<sup>175</sup>

“Risk is a never ending challenge.”

Coyle et al. (2010)

According to Coyle et al. (2010), the transport risk management process involves the four steps shown in Table 8.

<b>Identify</b>	Identify the likelihood and likely causes of transport disruptions.
<b>Analyse</b>	Analyse the negative fallout of these disruptions on operations and distribution.
<b>Manage</b>	Mitigate potential risk by implementing appropriate strategies.
<b>Review</b>	Review the risks frequently and at periodic intervals. Update the risk management plan if risks have changed or there are new ones.

Source: Coyle et al. (2010)

**Table 8:** Transport risk management process



### Warehousing

The fundamental premise that underpins the warehousing activities is that demand is never continuous, and therefore, to meet customer requirements at all times – especially in response to seasonality and sudden surge in demand – the organisation needs a system to stockpile raw material and finished goods.

<sup>175</sup> Coyle, J.J.; Novack, R.A.; Gibson, B.J. and Bardi, E.J. (2011), *Transportation: A Supply Chain Perspective*, 7th Ed: Cengage Learning

Warehousing is seen to be a “business within a business” (Ross, 2003)<sup>176</sup>. Its key properties are:

- high capital investment;
- the magnitude of physical assets.

In the simplest terms, a warehouse is “a place for the reception, delivery, consolidation, distribution and storage of goods and cargo”, and, warehousing is “the storing of goods and cargo”.<sup>177</sup> However, these definitions present a static view of warehousing.

Warehousing is defined as:

**“ that segment of an enterprise’s logistics function responsible for the storage and handling of inventories beginning with supplier receipt and ending at the point of consumption. The management of this process includes the maintenance of accurate and timely information related to inventory status, location, condition and disbursement. ”**

Ross (2003)

According to Ross (2003), the traditional perception of warehousing is led by the notion that warehouses are cost centres. However, contemporary warehouses are no longer a mundane facility for storing material and products, but “dynamic fulfilment centres” capable of “logistic postponement” and operating in an environmentally sustainable manner (p. 606). In a geographically diverse, outcome-driven supply chain, warehousing must play a proactive role within logistics. Organisations that adopt a supply network approach to compete in the marketplace treat warehousing as a “fundamental strategic source of competitive differentiation and marketplace leadership” (p. 536).

**“ Logistic postponement refers to delaying product related processes for the purpose of achieving differentiation advantage through mass customisation in a cost effective way in order to meet customer requirement. ”**

Garg and Tang (1997)<sup>178</sup>

## ! NEED TO KNOW

Warehousing involves high capital investment and significant physical assets.



## ✎ OVER TO YOU

### Activity 8: Logistic postponement

**Logistic postponement is a strategic activity that is possible only with warehousing. Logistic postponement cannot happen without warehousing.**

- 1 Research an example that demonstrates the importance of warehousing for logistic postponement, based on a real organisation.**

<sup>176</sup> Ross, D.F. (2003), *Distribution Planning and Control*. Kluwer Academic Publishers

<sup>177</sup> (2008) “Glossary of Shipping Terms” [online] Retrieved from: [https://www.marad.dot.gov/wp-content/uploads/pdf/Glossary\\_final.pdf](https://www.marad.dot.gov/wp-content/uploads/pdf/Glossary_final.pdf) [Accessed on: 25 September 2017]

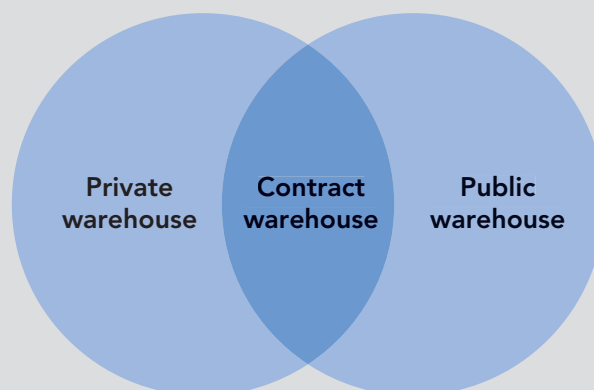
<sup>178</sup> Garg, A. and Tang, C. S. (1997), “On postponement strategies for product families with multiple points of differentiation”, *IIE Transactions*, 29, 641– 650

2 Prepare and deliver a two-minute talk to your class about the example you found.

“Warehousing is NO longer setting up storage racks, purchasing some material handling equipment and hiring staff.”

Ross (2003)<sup>179</sup>

Broadly, there are three types of warehouses, shown in Figure 8. Some of the features of these types of warehouses are presented in Table 9. Whether the focal organisation chooses to own and operate its own warehouses, or rent them from third-party logistics (TPL) providers is a strategic decision that is similar to a “do or buy” decision (Ross, 2004).



**Figure 8:** Three types of warehouses

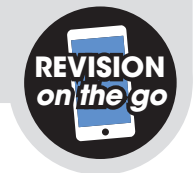


<sup>179</sup> Ross, D.F. (2003), *Distribution Planning and Control*: Kluwer Academic Publishers

Private warehouse	Third party logistics (TPL) (Outsourced warehouses)	
	Public warehouse	Contract warehouse
<p>High capital investment, however, cost-effective for high distribution volume.</p> <p>Can suffer from full capacity.</p>	<p>TPL providers are specialists who experience economies of scale and can therefore respond quickly to needs, and offer a low-cost alternative to company-owned warehouses.</p> <p>They also allow flexibility, as the focal organisation can expand or shrink the number and location of facilities they need in response to the market demand.</p>	<p>Offer the advantages of both private and public warehouses via a long-term contractual arrangement between the focal organisation and the TPL provider.</p> <p>This is a risk-sharing venture, as both the focal organisation and the TPL provider accepts some risk.</p>

Source: Ross (2003)

**Table 9:** Classification of warehouses according to ownership

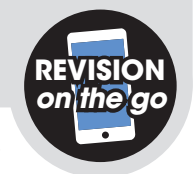


Warehousing performs four key functions (Min and Keebler, 2001),<sup>180</sup> explained in Table 10.

<b>Stockpiling</b>	This refers to the storage of raw material and finished products. Stockpiling allows the organisation to deal with discontinued demand, and to achieve economies of scale from bulk purchases.
<b>Stock mixing</b>	This is a “value-added function” of warehousing that involves reorganising the shipments in response to supply chain processes. For example, inbound logistics may require larger shipments to be segregated into smaller batches, and outbound logistics (transportation) may require consolidation of material into large shipments.
<b>Trans-loading or cross-docking</b>	This is an essential function of intermodal transportation that exploits the warehouse as a transfer station. The process involves separating and reorganising goods from shipments before further movement, and the aim is to reduce costs associated with “storage, multiple handling and delays” (see Figure 9).
<b>Contingency protection</b>	This is a risk management function that separates warehousing and production facilities in order to safeguard supply against events such as natural disasters and national emergencies.

Source: Min and Keebler (2001)

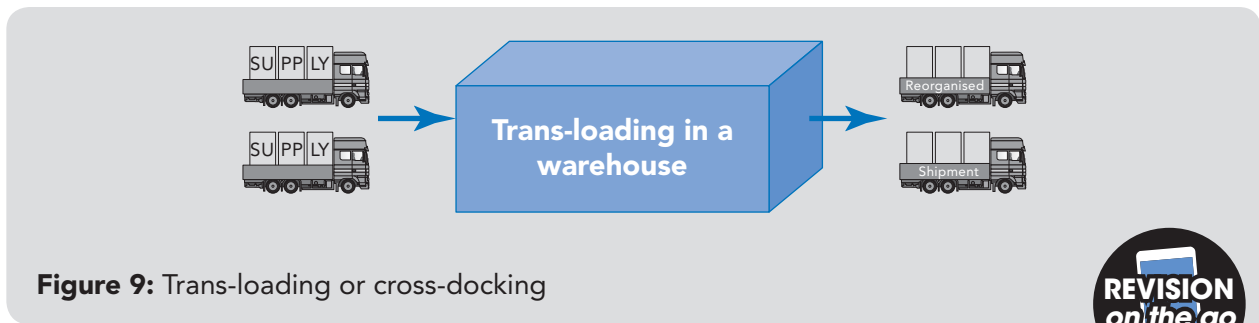
**Table 10:** Four functions of warehousing



<sup>180</sup> Min, S. and Keebler, J.S. (2001), “The Role of Logistics in Supply Chain”, in Mentzer, J.T., ed. (2001), *Supply Chain Management*. Sage Publications, p. 260

“Warehousing activities account for roughly one-fifth of logistics expenditure.”

Ross (2003)<sup>181</sup>



**Figure 9:** Trans-loading or cross-docking



Ross lists important questions that a logistics team should ask in order to achieve effective and efficient warehousing. For example, they need to know:

- the number and type of warehouses required;
- the planned level of use of the warehouse.

Answering these questions will help the organisation to:

- choose between private (owned), public, and contract warehouses, or an appropriate mix;
- choose between product-friendly or customer-friendly warehouses;
- decide whether the warehouse needs to accommodate the needs of future products.

## Location

The sole focus of the decision about a warehouse's location is the organisation's strategic goals. With this in mind, the key parameters that are evaluated for "location optimisation" include inbound transportation costs, proximity to customers (e.g. retail outlets), availability of inventory, flexibility to respond to the dynamic market conditions (e.g. "to be easily phased down or brought up") (Ross, 2015).<sup>182</sup>

## Warehousing management

Warehousing management involves operational management and strategic management. According to Ross (2015), warehousing assets can contribute to the focal organisation's profitability only when warehousing managers are included in the strategic planning process, and made fully aware of the organisation's "other functional business plans." Two warehousing strategies are stated in Table 11.

### Industry synergies

This involves the opportunity to exploit external economies by sharing facilities and transportation costs with co-players in the industry. If this is possible, then public or contract warehouses are preferred.

<sup>181</sup> Ross, D.R. (2015), *Distribution Planning and Control: Managing in the Era of Supply Chain Management*, 3rd Ed., p. 620: Springer

<sup>182</sup> *Ibid.*



**Total system costs**

The managerial challenge is to create warehousing facilities so that the “inventory and transportation costs” do not exceed the value obtained from increasing the number of warehouses in the distribution network. Since there is a limit to which costs decrease in relation to increases in the number of warehouses, warehousing managers seek the “least-cost point” to avoid a situation where they have to make a trade-off between market responsiveness and total logistics cost.

Source: Ross (2015)

**Table 11:** Examples of warehousing strategy



“Warehousing management is that function of the logistics system whose purpose is to enhance the quality of service through adequate stockpiling and reduce the total cost of the system by meeting changes in demand and supply.”

Voortman (2004)<sup>183</sup>

Voortman (2004) highlights two key areas of warehouse operational management, which are listed in Table 12. The costs associated with operating a warehouse are shown in Figure 10.

**Management of manpower and equipment**

Even though warehouse automation has increased, warehousing is currently a labour-intensive activity.

Equipment is expensive and requires periodic maintenance.

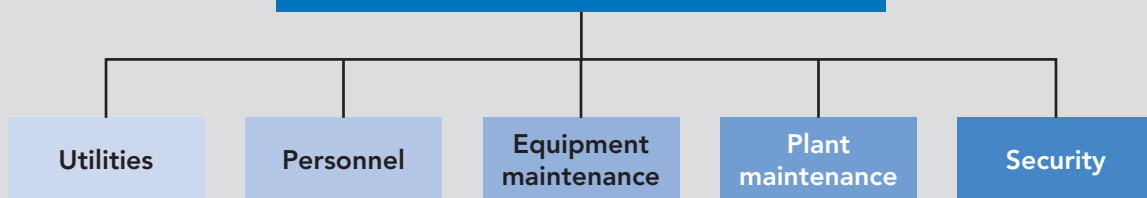
**Use of storage space**

This allows organisations to measure warehouse productivity.

**Table 12:** Two areas of warehouse operational management



**Warehouse annual carrying costs**



Adapted from: Ross (2003)

**Figure 10:** Possible costs of warehousing



183 Voortman, C. (2004), *Global Logistics Management*. Juta Academic

## Storage

As mentioned earlier, use of storage space is a measure of warehouse productivity. Managers must be aware of the ratio of used warehouse space to available space. The benchmark is that if used warehouse space drops below 80%, there is a negative impact on the warehouse's productivity and an increase in costs due to "damage and mispicks". In addition, market responsiveness may decline because of inappropriate slotting of products due to space constraints (Prince, 1998).<sup>184</sup>

## Planning

### Forecasting

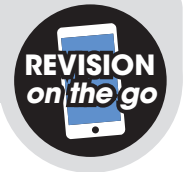
Forecasting is a planning tool that is used to manage future uncertainties. Forecasting is carried out by extrapolating either historic data or management's assumptions. Forecasts are different from budgets or short-term plans, but can be useful when preparing budgets.

Forecasting is defined as:

“*the use of historic data to determine the direction of future trends. This is typically based on the projected demand for the goods and services offered by the organization.*”

*Investopedia (2017)*<sup>185</sup>

Four important functions performed by warehousing are: stockpiling, stock-mixing, cross-docking and contingency protection.



Use of storage space is a measure of warehouse productivity.



### Approaches to forecasting

There are two broad approaches to forecasting, which are explained in Table 13.

Qualitative approach	Quantitative approach
This is an unscientific method led by managers' views, judgement and past experiences. It involves applying various qualitative forecasting techniques for collecting and assessing opinions to evaluate underlying relationships (Slack, Chambers and Johnston, 2010).	This is a scientific approach driven by statistical modelling.

<sup>184</sup> Prince, M. (1998), "Logistics Excellence", in Tompkins, J.A. and Smith, J.D., (1998), *The Warehouse Management Handbook*, 2nd Ed: Tompkins Press

<sup>185</sup> Investopedia (2017), "Forecasting" [online]. Retrieved from: <http://www.investopedia.com/terms/f/forecasting.asp> [Accessed on: 25th September 2017]

Qualitative approach	Quantitative approach
<p>These are some of the methods used.</p> <ul style="list-style-type: none"> <li>Panel approach. This involves a panel or a group of people brought together as an informal focus group where opinions are expressed freely.</li> <li>Delphi method. This is a formal qualitative approach where experts' opinions are collected through questionnaires, emails or other indirect methods. This approach does not involve face-to-face meetings and therefore participants are less likely to be influenced by others in the group</li> <li>Scenario planning. This approach is used for long-range forecasting. Participants in a panel think up several possible future scenarios, which they then discuss and analyse to identify risks and mitigation strategies.</li> </ul>	<p>These are some of the methods used.</p> <ul style="list-style-type: none"> <li>Time series method. A method based on the "assumption of continuity" (Scott, Lundgren and Thompson, 2011). The premise is that the trends of demand in the past are an indicator of future demand trends. In other words, historic demand can be helpful in estimating future trends in demand.</li> <li>Causal modelling. This method involves identifying relationships between variables in order to understand which variables have an effect on other variables (e.g. if Variable A changes, this may cause a change in Variable B). Causal relationships may be simple or complex. Causal modelling is not within the scope of this syllabus.</li> </ul>

**Table 13:** Two approaches to forecasting



Forecasting is an important managerial activity. There are two broad approaches to forecasting:

- 1 qualitative
- 2 quantitative

There are multiple methods of applying both of these approaches.



## Demand management

Organisations need to deal with fluctuations in demand. Demand planning can lead to "considerable supply chain savings" (Mentzer and Moon, 2005). Slack, Chambers and Johnston (2010) offer two approaches to demand management, which are explained in Table 14 and Table 15.

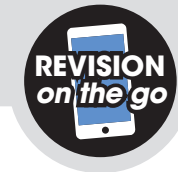
### Level capacity plan approach

Using this approach, the organisation overlooks the demand fluctuations and operates at a constant or uniform activity level throughout the planning period. As a result, there are no changes in the resources required and production is consistent. Unsold, non-perishable goods produced are transferred to finished goods stock to be sold at a later date.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Stable use of manpower.</li> <li>• High use of processes.</li> <li>• High productivity of employees.</li> <li>• Low unit cost.</li> </ul>	<ul style="list-style-type: none"> <li>• May lead to considerable stockpile and therefore high cost of warehousing.</li> <li>• Production decisions are based on the required level of inventory rather than the desired level of sales.</li> <li>• Not suitable for perishable, unpredictable or customised products.</li> <li>• Business may need to be operated at a high level of capacity as low use can make level capacity plans very expensive.</li> <li>• May result in poor customer service when demand is higher than the level capacity.</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 14:** Level capacity plan approach



### Chase demand plan approach

This is the opposite of the level capacity plan approach because capacity is not constant but is matched at each stage to the fluctuations in demand. In other words, the level capacity is adjusted to match the level of demand using different methods, which include:

- changing the idle time and overtime depending on the demand at a specific time;
- flexibility in staffing (increasing or decreasing manpower according to need);
- employing temporary or part-time employees, and ensuring full-time employees work longer hours;
- subcontracting.

As the level capacity varies from time to time, organisations need to manage their resources in line with these changes. Organisations generally do not prefer a pure chase demand approach especially if they produce non-perishable products or ones that can be easily stocked.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• May be more suitable for perishable, unpredictable or customised products.</li> </ul>	<ul style="list-style-type: none"> <li>• Unstable use of manpower.</li> </ul>

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Reduces warehousing costs, as there is no need to pile up stock.</li> </ul>	<ul style="list-style-type: none"> <li>• May lead to wastage of resources when demand is low.</li> <li>• Not advisable if manufacturing is capital-intensive as that would result in under-utilisation of capital resources.</li> <li>• If there are wide fluctuations in demand, it may be difficult to use this approach as varying the capacity significantly may not be feasible.</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 15:** Chase demand plan approach



## Stock levels

Stock is also known as inventory. It is defined as:

“the stored accumulation of material resources in a transformation system.”

Slack, Chambers and Johnston (2010)<sup>186</sup>

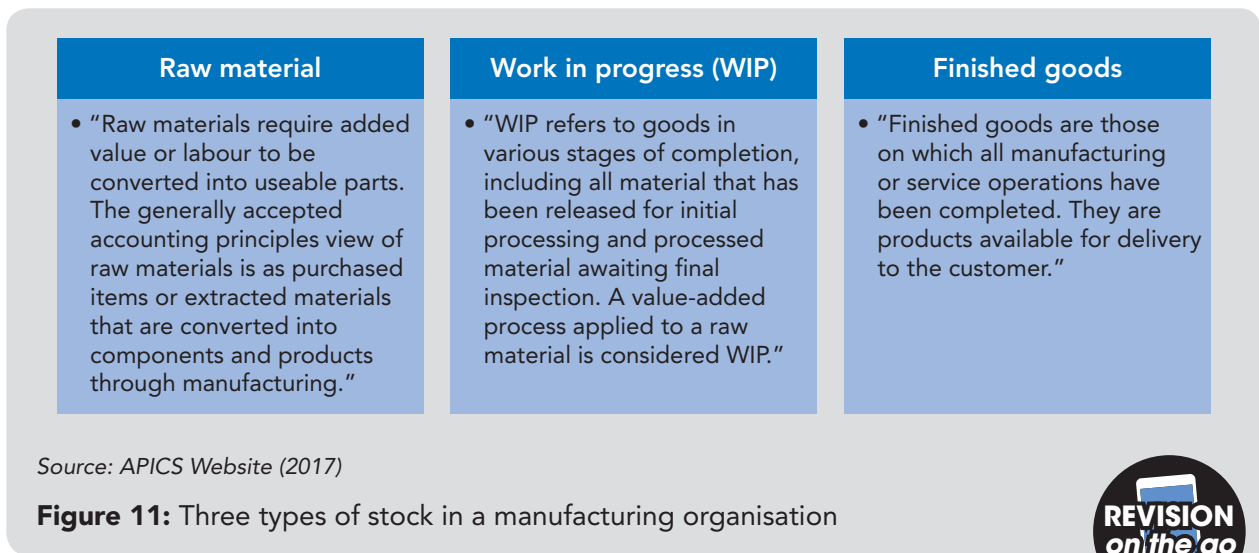
The focal organisation's need to maintain stock is determined by the nature of its business. Manufacturing and retail organisations need to stockpile, and stock makes up a sizeable part of their total assets. While there may be some organisations where the level of stock required remains fairly stable, there are others where stock levels vary over the year due to seasonality of demand. The production system adopted by the manufacturing organisation also influences the level of stock.

### Toyota

“The automobile giant's “just-in-time” production system eliminates stockpiling as the supplies are delivered directly to the production line of the business just in time for use in the production process.”

On a broad level, there are three types of stock in a manufacturing organisation. The APICS definition of each one is presented in Figure 11.

<sup>186</sup> Slack, Chambers and Johnston (2010), *Operations Management*, p. 342



## OVER TO YOU

### Activity 9: Stock

- 1 Download the latest annual reports (available on websites) for a manufacturing company, a large retail company, a supermarket and a utility provider.
- 2 What is the percentage of stock in the total assets of each of these companies?
- 3 Why are there differences in the stock levels?

### Why is stock necessary?

Slack, Chambers and Johnston (2010) mention that stock may be necessary for a business for a number of reasons (see Table 16).

To meet immediate customer requirements
To meet production requirements
To deal with expected increases in future cost of stock
To get cost savings (discounts) from bulk purchase
To avoid shortfall of future supplies due to disruption or scarcity

Source: Slack, Chambers and Johnston (2010)

**Table 16:** Why organisations need stock



### Detailed classification of stock

Slack, Chambers and Johnston (2010) classify stock into five categories, explained in Table 17.

Category	Definition
Buffer stock or "safety inventory"	Stock required to cope with fluctuations in supply and demand or to manage uncertainties in the demand and lead-time.
Cycle stock	The average inventory required when products are made in batches. This ensures smooth production even when the production process is not able to provide all items simultaneously.
Pipeline stock	This type of stock is required because of the lead-time between the placing of an order with the supplier and delivery of the items to the organisation. This covers the shortfall in stock when supplies are in transit.
Anticipation stock	This is primarily used when a business needs to manage increased seasonal demand. The demand is anticipated and predictable to an extent. This type of stock is used when there are large fluctuations in demand.
Decoupling stock	This is also called intermediate stock because it is collected between two interdependent operations with the purpose of avoiding any restriction on output from the next operation in case there are "fluctuations in the production rate of supplying operations" (APICS website, 2017).

Source: Slack, Chambers and Johnston (2010)

**Table 17:** Categories of stock



## ! NEED TO KNOW

Stock can be classified into five categories: buffer stock, cycle stock, pipeline stock, anticipation stock and decoupling stock.



### Costs associated with stock

There are costs and risks associated with holding or carrying stock that are called inventory carrying costs, and there are costs and risks associated with not holding enough stock. These costs and risks are listed in Table 18.

Costs and risks of holding stock	Cost and risk of NOT holding stock
<ul style="list-style-type: none"> <li>• Storage and handling costs</li> <li>• Financing cost or interest on capital tied up in stock</li> <li>• Insurance costs</li> <li>• Cost of loss resulting from deterioration, obsolescence or theft</li> <li>• Opportunity cost</li> </ul>	<ul style="list-style-type: none"> <li>• Out-of-stock cost</li> <li>• Loss of goodwill</li> <li>• Increased cost of transportation due to multiple small orders</li> <li>• Inefficient production scheduling</li> <li>• Lost production due to shortage of raw materials</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 18:** Costs associated with holding and not holding stock



Having the right quantity of stock for efficient operations is a balance between excessive stock and insufficient stock.

## ✎ OVER TO YOU

### Activity 10: Stock Level

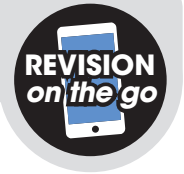
Explain how each of the following will affect an organisation's required level of stock.

- 1 Changing from a supplier in a different city to a local supplier
- 2 An increase in the rate of interest
- 3 Stopping production of one of the two products the company manufactures
- 4 Recent fluctuations in demand of one of the two products





There are costs and risks associated with holding stock and with NOT holding enough stock.



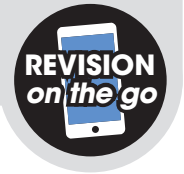
### Reviewing stock levels

According to Slack, Chambers and Johnston (2010), operations managers need to make three important decisions related to stock at any point of time (see Table 19).

<b>Volume decision</b>	How much stock to order?
<b>Timing decision</b>	When to order?
<b>Control decision</b>	How to control the system?

Source: Slack, Chambers and Johnston (2010)

**Table 19:** Three stock-related decisions



## The volume decision

The Economic Order Quantity (EOQ) model is a popular tool for making a volume decision. However, the EOQ model is based on certain assumptions that may not always hold true. Some of these assumptions are listed in Table 20.

The demand for stock can be predicted with accuracy. It is constant and evenly spread over the period. It does not fluctuate due to seasonality or other reasons.

Stock is replenished just at the point that the business runs out of stock.

There is no need for buffer stock.

There are no bulk purchasing discounts.

Source: Atrill and McLaney (2007)

**Table 20:** Assumptions of the EOQ model



The EOQ model is based on two key categories of costs associated with stock management (refer to Table 21).

### Holding or carrying costs

These include cost of storage space, cost of insurance, interest on capital tied up in stock, loss from deterioration, theft and obsolescence.

### Ordering costs

These include cost of placing an order, transmission, material handling, and a portion of the freight if the amounts vary according to the size of the order, receiving, inspecting, stocking, invoice processing.

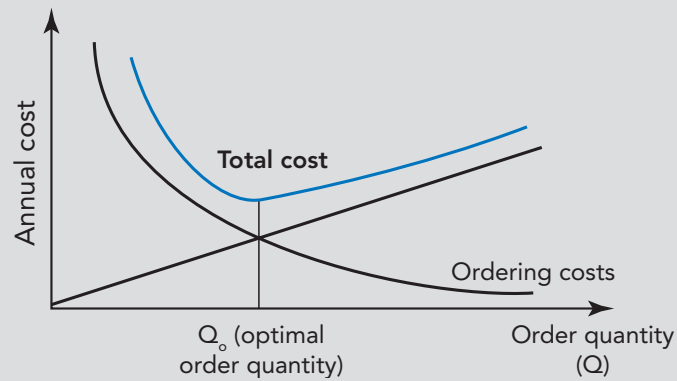
Source: Atrill and McLaney (2007)

**Table 21:** Costs categories used in the EOQ model



According to Atrill and McLaney (2007), managers strive to keep stock levels at a minimum because of the high costs associated with holding stock. However, there are ramifications of doing this. Reducing the holding cost will lead to an increase in ordering costs, creating a dilemma, as managers will need to decide between minimising holding costs and minimising ordering costs.

The EOQ model can help to balance these costs because it calculates the optimum size of the purchase order by taking into account the holding and ordering costs. The EOQ is the purchase order quantity that minimises total order cost plus holding cost. It is the order quantity for a stock item that will minimise the combined cost of stock ordering and stock holding over a given period of time. This is shown in Figure 12.



**Figure 12:** Economic Order Quantity (EOQ)



Mathematically, EOQ can be calculated as:

$$EOQ = \sqrt{\frac{2DC}{H}}$$

Where:

$D$  = annual demand expressed in units

$C$  = cost of placing an order

$H$  = annual holding cost per unit

The EOQ model is not directly influenced by the price paid to the supplier, as it does not take into account the purchase price or the buying cost of the item. Instead, it focuses on the administrative costs of placing each order and the costs of holding the stock. However, the purchase price may have an indirect effect on the economic order size that the model calculates when the items are relatively expensive. The model also assumes that there is no discount for bulk quantities, however organisations often benefit from bulk purchasing economies. Buying in bulk may decrease the annual purchase price and ordering cost, but may increase the holding costs (Atrill and McLaney, 2007).

### OVER TO YOU

#### Activity 11: Volume decision – Economic Order Quantity (EOQ)

Gareth is a retailer who sells Product X that he buys from LM Company. Every year he buys 36,750 units of Product X at a cost of \$12 each. He can obtain fresh supplies of stock instantaneously but the cost of placing an order is \$200. The annual cost of holding one unit is \$1.20.

- 1 Calculate the EOQ.
- 2 Calculate the total annual cost of stock.

**OVER TO YOU****Activity 12: Volume decision with discount**

**LM Company decides to offer Gareth a 2% discount on orders of 5000 units or more and a 2.5% discount on orders of 7500 units or more.**

**Calculate the new EOQ.**

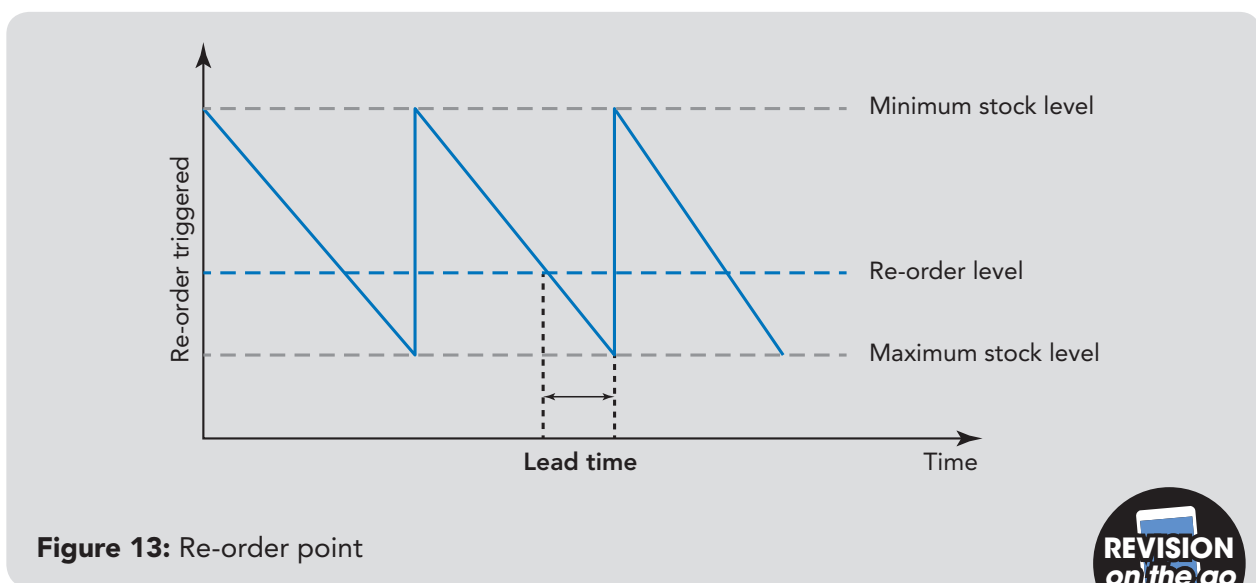


## Reviewing timing decision

### The timing decision

The EOQ model assumes that there is a predictable demand and that orders are replenished instantaneously. Theoretically, it is easy to decide that the order should be placed when the stock level is at zero. In other words, the re-order point is when all the stock has been sold. However, this is far from ideal, as there is always a gap between the time an order is placed and the time the focal organisation receives the goods. This gap is known as lead-time (Slack, Chambers and Johnston, 2010).

The re-order point, in reality, is “the point at which stock will fall to zero minus the order lead time” (Slack, Chambers and Johnston, 2010). It can also be described in terms of the re-order level: the level at which a new order is placed with a supplier. When the stock level reaches the re-order level, a new order for supplies needs to be triggered. The difference between the time of re-order and delivery should not be more than the lead-time. This is shown in Figure 13.



**Figure 13:** Re-order point



The diagram above is based on the assumption that demand and lead times are predictable. This is again purely theoretical, so to avoid the risk of stock-out, supplies need to be re-ordered earlier than this purely theoretical model would indicate. This will ensure that there is buffer or safety stock to prevent stock-out if there is a delay in receiving supplies or an increase in demand. The level of buffer and safety stock needs to be determined methodically (this is outside the scope of the syllabus).

The replenishment approach shown here is also known as the “continuous review approach”, as it involves continual reviews of the stock level of each item (Slack, Chambers and Johnston, 2010). A continuous review approach will result in the organisation placing same size orders (possibly determined using the EOQ model) in a non-uniform manner, which is time-consuming.

The other approach is a “periodic review approach”. The orders for fresh supplies are made at regular fixed times rather than at the re-order level. The time interval between two orders can also be determined on the basis of the EOQ model (Slack, Chambers and Johnston, 2010).

$$T = \frac{EOQ}{D} \times 12$$

Where:

$T$  = optimum time interval

$EOQ$  = Economic Order Quantity

$D$  = annual demand



## OVER TO YOU

### Activity 13: Timing decision

**Gareth decides that the order size will be the Economic Order Quantity (EOQ) every time he places the order with LM Supplies. It takes two weeks for an order to be delivered.**

**How frequently will Gareth place an order with LM Supplies?**



## OVER TO YOU


### Activity 14: Re-order point

- 1 The lead-time for Gareth's orders is four weeks and the demand of Product X is steady throughout the year. At what quantity of Product X should Gareth re-order?**
- 2 How much stock should Gareth have on hand when he places the order?**
- 3 At what level should Gareth re-order if he decides to maintain a safety stock of 500 units?**

### Reviewing control decisions

Most organisations need to manage multiple stock items. There is no one-size-fits-all approach to managing different items because some items are more important than others, and therefore require a different approach to monitoring and control. Here, the extent of control is important, and this will differ for different types of stock. This is a trade-off decision. Operations managers review the stock held and classify it for effective control decision.

To avoid any risk of stock-out, it is important to systematically determine the level of buffer and safety stock.

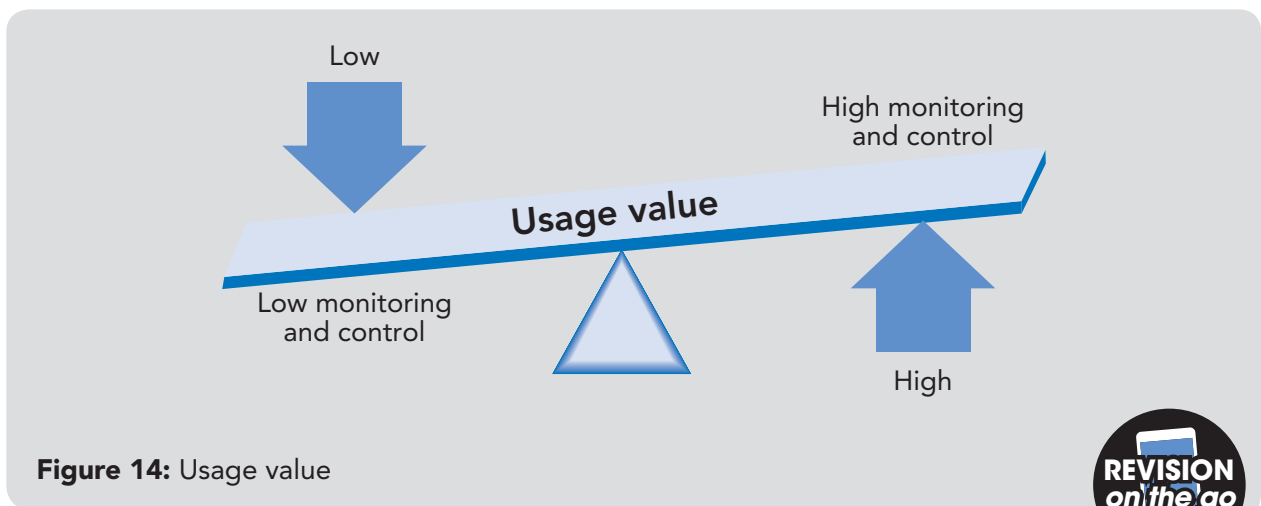


### ABC system of stock control

The ABC system of stock control targets different levels of control for different items of stock held. The stock is categorised into three classes: A, B and C based on the usage value of stock items.

$$\text{Usage value} = \text{rate of usage} \times \text{individual value}$$

Usage value has a direct relationship with monitoring and control, as shown in Figure 14.




Stock is categorised into three classes, explained in Table 22.

<b>Class A</b>	These include high-usage value items. Around 20% of high-usage value items account for 80% of the total usage value.
<b>Class B</b>	These include medium-usage value items. Generally 30% of Class B items account for 10% of the total usage value.
<b>Class C</b>	These include low-usage value items. Generally 50% of Class C items account for 10% of the total usage value.

Source: Slack, Chambers and Johnston (2010)

**Table 22:** Classes of stock in ABC analysis



In addition to considering annual usage and value to classify stock items, there are three other factors that may be considered (Slack, Chambers and Johnston, 2010). These are listed in Table 23.

<b>Stock-out risk</b>	Items that have the potential to cause failure in production or in meeting market requirements need closer monitoring.
<b>Uncertainty of supply</b>	Items having "erratic or uncertain" supplies may require more attention.
<b>High risk of obsolescence or deterioration</b>	Items having a higher risk of "obsolescence or deterioration" need additional control or monitoring.

Source: Slack, Chambers and Johnston (2010)

**Table 23:** Other factors in classifying stock using ABC analysis



Classification of stock items highlights stock items that have high-usage value since they constitute 80% of the value of the total stock. Other factors that determine classification are: stock-out risk, uncertainty of supply and risk of obsolescence.



## Just-in-time

### CASE STUDY: NISSAN

#### Just-in-time

Nissan is a global automobile giant with headquarters in Japan. It has manufacturing plants in several overseas locations, including one plant in Sunderland in northeast England.

The Sunderland plant has an effective just-in-time (JIT) system that manages over 200 suppliers of various automotive parts and materials. Nissan has a partnership sourcing arrangement with many of its suppliers, who, in turn, treat Nissan as their strategic client. Some of the suppliers have strategically chosen to locate their facility close to Nissan's manufacturing plant. One of them is a supplier of car furnishing who meets Nissan's requirement of a stock replenishment response time of less than 30 minutes. This results in very substantial cost savings for Nissan.



Source: Adapted from Atrill and McLaney (2007)

Just-in-time (JIT) originated in Japan, and is often viewed as a radical approach to stock management as it eliminates the need to hold any stock.



One definition of just-in-time is:

“ a method of planning and control and an operations philosophy that aims to meet demand instantaneously with perfect quality and no waste. ”

Slack, Chambers and Johnston (2010)<sup>187</sup>

JIT is not just a strategy to achieve maximum cost efficiency but also a philosophy that requires a cultural shift in most organisations. JIT is designed to deliver supplies straight from the supplier to the organisation “just-in-time” for the production process or for sale. This transfers the cost of holding the stock from the manufacturer or retailer to the supplier.

Although this minimises the cost of stock and eliminates waste, it increases the risk for the focal organisation because the organisation becomes more dependent on the supplier for its smooth operations. JIT is based on the premise that the supplier will always deliver good quality stock on time, and that the organisation that adopts JIT will operate smoothly (no breakdowns for manufacturing organisations). Any delay or problems at the supplier’s end can cause major disruption for the organisation. It also assumes that the queuing and storage time for stock is eliminated and only the time spent in processing supplies is seen to add value. These are almost unrealistic assumptions.

JIT is a partnership-centric approach to supply chain management, in which both the focal organisation and the supplier are two cogs in the economic wheel, with production lines and planning processes completely synchronised. However, there is a supplier-related risk that must be managed.

Although the organisation that has adopted JIT can save on the cost of stock holding, there may be other costs associated with JIT. For example, the supplier who bears the holding cost may increase the price of stock to recover this cost. In addition, the focal organisation is contractually tied to the supplier and therefore may not be able to take advantage of lower prices offered by another supplier.

Slack, Chambers and Johnston (2010) point to the advantages and disadvantages of JIT, listed in Table 24.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• JIT is a customer-centric approach to managing operations that aims to meet customer demand in minimum time while achieving minimum inventory carrying cost, minimum waste from over-production, and maximum quality.</li> <li>• Because JIT involves lean purchasing, the cost of administration is also reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate only when demand is stable.</li> <li>• Requires a motivated and multi-skilled workforce, which requires investment in training and development.</li> <li>• A cultural shift may be required that may adversely impact workforce performance.</li> </ul>

<sup>187</sup> Slack, Chambers and Johnston (2010), *Operations Management*, p. 663

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• JIT creates a lean supplier network, which has a positive effect on managerial cost.</li> <li>• Because the key JIT objective is to get inventory of the right quantity at the right time at the right place, unnecessary inbound logistics is reduced, which results in reduced costs of transportation and warehousing.</li> <li>• JIT is a proven best practice in the automobile industry, and makes a positive contribution to achieving key performance indicators such as delivery reliability and asset management efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>• JIT demands real-time flow of information and therefore an investment in information technology infrastructure.</li> <li>• Disruption in one stage affects the whole process and therefore leads to lower capacity utilisation.</li> <li>• Increases supply chain risk at the cost of achieving efficiency.</li> </ul>

Source: Slack, Chambers and Johnston (2010)

**Table 24:** Advantages and disadvantages of JIT



## Understanding stock turnover

Stock constitutes a substantial proportion of many organisations' total investment in assets. For example, a manufacturing business requires a much higher investment in stock than a business providing just services, as the latter may hold little, if any, stock. Similarly, a supermarket or a retail business will have much higher levels of stock than an airline operator.

The focal organisation needs to turn over or convert its stock into sales as quickly as possible because slow-moving stock depletes its return on investment. In general terms, the number of times the organisation is able to turn over or convert its stock into sales is known as stock turnover.

“ *Stock turnover, also known as inventory turnover, 'is a measure of management's ability to control its investment in inventor'.* ”

Atkinson, Kaplan and Young (2004)<sup>188</sup>

Stock turnover can be expressed in terms of:

- rate of stock turnover;
- stock turnover period.

188 Atkinson, A.A.; Kaplan, R.S. and Young, M.S. (2004), *Management Accounting*, p. 568: Pearson/Prentice Hall

These are explained in Table 25.

Rate of stock turnover	Stock turnover period
<p>This indicates the number of times the stock is converted into sales. It is calculated as:</p> $\text{Rate of stock turnover} = \frac{\text{cost of sales}}{\text{average stock}}$ <p>Where,</p> $\text{average stock} = \frac{\text{opening stock} + \text{closing stock}}{2}$ <p>In highly seasonal businesses, average stock may be calculated as a monthly average because stock levels vary considerably over the year.</p> <p>When the stock levels do not vary from month to month, stock turnover may be measured as:</p> $\text{Rate of stock turnover} = \frac{\text{cost of sales}}{\text{year end stock}}$ <p>Because stock is measured at cost to determine the rate of stock turnover, the average stock is related to the cost of sales rather than sales revenue.</p>	<p>This is based on average stock and cost of sales. It is calculated as:</p> $\text{Stock turnover period} = \frac{365}{\text{rate of stock turnover}}$ <p>OR</p> $= \left( \frac{\text{average stock}}{\text{cost of sales}} \right) \times 365$ <p>Stock turnover period indicates the average period for which stock is held by the organisation. The shorter the turnover period of stock, the better it is for the organisation.</p>
<p><b>Significance:</b> The rate of stock turnover measures an organisation's efficiency in managing its stock. The higher the rate of stock turnover, the more efficient the organisation is at managing its stock. By monitoring the rate at which stock turns over, the organisation is able to control its stock.</p>	<p><b>Significance:</b> This is a useful measure for making comparisons with other businesses. It is possible to calculate the average inventory turnover period for individual stock types as well as for overall stock.</p>

**Table 25:** Stock turnover



Conversion of stock into sales as quickly as possible is important because slow-moving stock depletes the organisation's return on investment.



Rate of stock turnover and stock turnover period are illustrated in an extract from Walmart's Annual Reports 2016, shown in Figures 15 (a) and (b).

Consolidated Statements of Income				
(Amounts in millions, except per share data)	Fiscal Years Ended January 31,			
	2016	2015	2014	
<b>Revenues:</b>				
Net sales	\$478,614	\$482,229	\$473,076	
Membership and other income	3,516	3,422	3,218	
<b>Total revenues</b>	<b>482,130</b>	<b>485,651</b>	<b>476,294</b>	
<b>Costs and expenses:</b>				
Cost of sales	360,984	365,086	358,069	
Operating, selling, general and administrative expenses	97,041	93,418	91,353	
<b>Operating Income</b>	<b>24,105</b>	<b>27,147</b>	<b>26,872</b>	
<b>Interest:</b>				
Debt	2,027	2,161	2,072	
Capital lease and financing obligations	521	300	263	
Interest income	(81)	(113)	(119)	
Interest, net	2,467	2,348	2,216	
<b>Income from continuing operations before income taxes</b>	<b>21,638</b>	<b>24,799</b>	<b>24,656</b>	
<b>Provision for income taxes:</b>				
Current	7,584	8,504	8,619	
Deferred	(1,026)	(519)	(514)	
<b>Total provision for income taxes</b>	<b>6,558</b>	<b>7,985</b>	<b>8,105</b>	
<b>Income from continuing operations</b>	<b>15,080</b>	<b>16,814</b>	<b>16,551</b>	
<b>Income from discontinued operations, net of income taxes</b>	<b>—</b>	<b>285</b>	<b>144</b>	
<b>Consolidated net income</b>	<b>15,080</b>	<b>17,099</b>	<b>16,695</b>	
<b>Consolidated net income attributable to noncontrolling interest</b>	<b>(386)</b>	<b>(736)</b>	<b>(673)</b>	
<b>Consolidated net income attributable to Walmart</b>	<b>\$ 14,694</b>	<b>\$ 16,363</b>	<b>\$ 16,022</b>	

Source: Walmart Investors Relations website

Figure 15(a): Walmart's Consolidated Statement of Income



(Amounts in millions, except per share and unit count data)	2016	2015	2014	2013	2012
<b>Operating results</b>					
Total revenues	\$482,130	\$485,651	\$476,294	\$468,651	\$446,509
Percentage change in total revenues from previous fiscal year	(0.7)%	2.0%	1.6%	5.0%	6.0%
Net sales	\$478,614	\$482,229	\$473,076	\$465,604	\$443,416
Percentage change in net sales from previous fiscal year	(0.7)%	1.9%	1.6%	5.0%	6.0%
Increase (decrease) in calendar comparable sales <sup>(1)</sup>					
in the United States	0.3%	0.5%	(0.5)%	2.4%	1.6%
Walmart U.S.	1.0%	0.6%	(0.6)%	2.0%	0.3%
Sam's Club	(3.2)%	0.0%	0.3%	4.1%	8.4%
Gross profit margin	24.6%	24.3%	24.3%	24.3%	24.5%
Operating, selling, general and administrative expenses, as a percentage of net sales	20.3%	19.4%	19.3%	19.0%	19.2%
Operating income	\$ 24,105	\$ 27,147	\$ 26,872	\$ 27,725	\$ 26,491
Income from continuing operations attributable to Walmart	14,694	16,182	15,918	16,963	15,734
Net income per common share:					
Diluted income per common share from continuing operations attributable to Walmart	\$ 4.57	\$ 4.99	\$ 4.85	\$ 5.01	\$ 4.53
Dividends declared per common share	1.96	1.92	1.88	1.59	1.46
<b>Financial position</b>					
Inventories	\$ 44,469	\$ 45,141	\$ 44,858	\$ 43,803	\$ 40,714
Property, equipment, capital lease and financing obligation assets, net	116,516	116,655	117,907	116,681	112,324
Total assets <sup>(2)</sup>	199,581	203,490	204,541	202,910	193,120
Long-term debt <sup>(3)</sup> and long-term capital lease and financing obligations (excluding amounts due within one year)	44,030	43,495	44,368	41,240	46,818
Total Walmart shareholders' equity	80,546	81,394	76,255	76,343	71,315

Source: Walmart Investors Relations website

Figure 15(b): Walmart's five-year financial summary



Table 26 shows the calculation of rate of stock turnover and stock turnover period for Walmart for three years along with the analysis.

<b>2016</b>	$\text{Average stock} = \frac{45,141 + 44,469}{2} = \frac{89,610}{2} = 44,805$ $\text{Rate of stock turnover} = \frac{360,984}{44,805} = 8.05 \text{ times}$ $\text{Stock turnover period} = \frac{365}{8.05} = 45.34 \text{ days}$
<b>2015</b>	$\text{Average stock} = \frac{44,858 + 45,141}{2} = \frac{89,999}{2} = 45,000$ $\text{Rate of stock turnover} = \frac{365,086}{45,000} = 8.11 \text{ times}$ $\text{Stock turnover period} = \frac{365}{8.11} = 45 \text{ days}$
<b>2014</b>	$\text{Average stock} = \frac{43,803 + 44,858}{2} = \frac{88,661}{2} = 44,330.5$ $\text{Rate of stock turnover} = \frac{358,069}{44,330.5} = 8.08 \text{ times}$ $\text{Stock turnover period} = \frac{365}{8.08} = 45.2 \text{ days}$

**Table 26:** Analysis of Walmart's rate of stock turnover and stock turnover period



### Analysis

It can be seen that the average rate at which the stock turns over into sales is a little over 8. In 2016, there was a slight decline in the organisation's efficiency in managing its stock, compared to 2015.

The average time taken for stock to turn over or get converted into sales is 45 days. This has gone up over the last year, indicating that it took slightly longer to convert stock to sales in 2016 than it did in 2015.

Comparing the stock turnover period of different organisations can be a way to analyse the focal organisation's efficiency in managing stock.

 OVER TO YOU
**Activity 15: Stock turnover**

Select one of the four companies you used in Activity 9. Download the annual report of another year.

**1 Calculate the following for the chosen company:**

- rate of stock turnover;
- stock turnover period.

**2 Write a brief analysis of the efficiency of the company stock management.**

**3 Compare this efficiency with Walmart's stock management efficiency (as shown in the examples on the previous pages).**

**READING LIST**

- Atkinson, A.A., Kaplan, R.S. and Young, M.S. (2004), *Management Accounting*, Pearson/Prentice Hall
- Atrill, P. and McLaney, E. (2007), *Management Accounting for Decision Makers*, 5th Ed., FT/Prentice Hall
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- Ross, D.F. (2015), *Distribution Planning and Control: Managing in the Era of Supply Chain Management*, 3rd Ed., Springer
- Rushton, A., Croucher, P. and Baker, P. (2017), *The Handbook of Logistics and Distribution Management*, 6th Ed., Kogan Page
- Slack, N., Brandon-Jones, A. and Johnston, R. (2013), *Operations Management*, 7th Ed., Pearson

## Summary

- Logistics management is the “part of supply chain management that plans, implements, and controls 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 customers’ requirements.”
- “Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organisation and its marketing channels in such a way that current and future profitability are maximised through the cost-effective fulfilment of orders.”
- Logistics activities include: inbound and outbound transportation management, fleet management, warehouse management and order management.
- Some other important logistics activities are logistics network design, supply-demand forecasting and third-party logistics service management.
- Co-ordination between logistics and other organisational functions is essential for smooth operations.
- Parameters for evaluating logistics performance include: logistics costs, efficiency in inventory management, availability of product in the market, delivery (time and quantity).
- The three reasons for treating logistics as a critical component of the supply network strategy are competition, costs and internationalisation.
- The total logistics costs are the sum of:
  - inbound and outbound transportation costs;
  - facilities costs that include warehousing, distribution centres, and handling equipment;
  - inventory costs;
  - material handling costs;
  - packaging costs;
  - administration costs for order processing and invoicing;
  - managerial costs.
- Logistics strategy is the link between corporate strategy, production and distribution.
- Two physical facilities that are used to execute logistics strategy are transportation and warehousing.
- Transportation accomplishes two important physical tasks in the logistics pipeline: movement of material and products, and storage of material and products.
- Transportation links the components of a supply chain’s complex functional structure and an extensive global structure, and so becomes the most important accessory of the marketing mix.
- In current logistics systems:
  - international logistics pipelines require intermodal transportation;
  - each mode has a unique economical and technical structure;
  - each mode has a unique quality of link service;
  - third-party transportation service providers serve the focal organisation with multiple capabilities.
- There are three principles that govern transportation planning: economies of scale, economies of distance and cost of velocity.

- Transportation failure causes a delay in deliveries, leads to loss by damage or theft in transit, and, as a result, ends in quantitative and qualitative loss for the organisation.
- Key properties of warehousing are: high capital investment and the magnitude of the physical assets.
- Logistic postponement refers to delaying product-related processes in order to achieve a competitive advantage through mass customisation in a cost-effective way in order to meet customers' requirements.
- There are three types of warehouses: private warehouses, contract warehouses and public warehouses.
- Warehousing performs four key functions: stockpiling, stock mixing, trans-loading or cross-docking, and contingency protection.
- Two warehousing strategies are: industry synergies and total system costs.
- Key areas of warehouse operational management include management of manpower and equipment, and storage space utilisation.
- Storage space use is a measure of warehouse productivity.
- Forecasting is a planning tool carried out by extrapolating either historic data or management's assumptions.
- There are two broad approaches to forecasting: qualitative approach and quantitative approach.
- Methods used in a qualitative approach include panel approach, Delphi method and scenario planning.
- Methods used in a quantitative approach include time series method and causal modelling.
- Demand management can lead to considerable supply chain savings. Two key approaches for demand management are level capacity plan approach and chase demand plan approach.
- There are three types of stock in a manufacturing organisation: raw material, work in progress and finished goods.
- Stock can also be classified as buffer stock, cycle stock, pipeline stock, anticipation stock and decoupling stock.
- There are costs and risks associated with holding stock, and with not holding enough stock, so it is important to strike a balance between the two.
- Operations managers need to make three important decisions related to stock at any point of time: volume decision, timing decision and control decision.
- The Economic Order Quantity (EOQ) model is a popular tool for making a volume decision. It is based on two key categories of costs associated with stock management: holding cost and ordering cost.
- The re-order point for stock is the point at which stock will fall to zero minus the order lead-time.
- A continuous review approach will result in the organisation placing same size orders in a non-uniform manner.
- The ABC system of stock control targets different levels of control for different items of stock held. It categorises stock into three classes: Class A (high-usage value items), Class B (medium-usage value items) and Class C (low-usage value items).
- JIT is often viewed as a radical approach to stock management, as it eliminates the need to hold any stock.
- Just-in-time (JIT) is a partnership-centric approach to supply chain management, where both the focal organisation and the supplier are two cogs in the economic wheel, with production lines and planning processes completely synchronised.



- The focal organisation needs to turn over or convert its stock into sales as quickly as possible as slow-moving stock depletes the organisation's return on investment.
- Stock turnover, also known as inventory turnover "is a measure of management's ability to control its investment in inventory".
- Stock turnover can be expressed in terms of rate of stock turnover and stock turnover period.
- Rate of stock turnover indicates the number of times stock is converted into sales.
- Stock turnover period indicates the average period the organisation holds stock for. The shorter the turnover period of stock, the better it is for the organisation.

## Glossary

**Arbitrage opportunity** The opportunity used by the focal firm to get access to raw materials, finished goods and workforce at relatively less cost than in their own country.

**Automation** Large-scale use of machines in operations. This often results in higher productivity and greater efficiency in the long run, but also leads to de-skilling of workforce and unemployment.

**Business strategy** The organisation's strategy to compete against its rivals in either multiple market segments or a niche segment. The generic business strategy of the organisation is built on cost leadership (efficiency-driven), or differentiation (driven by core competence and capabilities), or a mix of cost leadership and differentiation. Also called competitive strategy.

**Capabilities** The unique arrangement of routine activities and processes in operations that produces results superior to its rivals, and therefore becomes a key source of competitive advantage. For example, a global fast food chain's ability to develop functional co-ordination that results in consistent and standardised quality of goods and services in its facilities all over the world.

**Capacity** The inherent limit of one or more aspects of operations. For example, a short distance intercity airline can fly its aircraft only for a limited number of flights each day.

**Competitive advantage** The organisation's edge over its rivals. According to Michael Porter, two key sources of competitive advantage are low costs and superior benefits.

**Core competences** The unique and non-substitutable activities in the organisation's operations that are its key source of competitive advantage. For example, the airflow and air suction expertise of a company allows it to offer superior vacuum cleaners, hand dryers and fans.

**Corporate objectives** The unambiguous, specific and time-driven goals that the organisation sets for itself. For example, to

achieve a certain percentage of market share in one year.

**Corporate social responsibility** The positive behaviour expected from organisations in their end-to-end transactions. For example, making sure that material used in production does not harm the environment, and supporting cause-driven non-governmental organisations (NGOs) that work for community welfare.

**Corporate strategy** The natural or deliberate route that the organisation takes to grow and/or exhibit superior performance. Corporate strategy becomes visible when the organisation takes actions such as launching a new product, expanding into a new market (e.g. international markets), buys a rival firm, buys a supplier, bypasses intermediaries to connect directly with customers, makes investment into a completely new business, and withdraws from an existing, unprofitable business.

**Cost of poor quality** Preventive, evaluative or remedial costs that are incurred because of defects and shortfalls in products during pre-production, production and post-production stages.

**Cost leadership** A business or competitive strategy that allows the organisation to gain competitive advantage as a result of superior cost efficiencies compared to competitors. When achieved, the cost leadership strategy allows the organisation to offer the most competitive prices to its customers.

**Customer loyalty** Customer behaviour that drives the customer to consistently make repeat purchases from the same supplier/retailer.

**Cyber attack** The deliberate and malicious hacking of an organisation's information systems infrastructure by external agents with the aim of disrupting the firm's operations.

**Differentiation** A business or competitive strategy that allows the firm to gain a competitive advantage as a result of its superior product/service. When achieved, differentiation allows the organisation to gain high margin because of customers' willingness to pay premium price.

**Distribution** The activity that is performed to get the finished goods to the market with the purpose of making sales. Also called physical distribution.

**Dividends** A part of the after-tax profit that the organisation distributes to its shareholders as a return on their investment.

**Downstream** The part of the supply chain that links the focal organisation to its customers.

**E-business** The focal organisation's use of the internet to perform some of the operations' activities.

**E-commerce** The focal organisation's use of the internet to sell goods and services directly to the customer. E-commerce has shrunk, and in some cases eliminated, the intermediaries that previously dominated the distribution function.

**E-procurement** The focal organisation's use of the internet to purchase goods and services directly from suppliers. For repeat and frequent re-buys, e-procurement offers the advantage of long-term cost efficiencies.

**Effective** A description of activities that achieve stated objectives.

**Efficient** A description of activities and processes that use minimum resources, and therefore result in minimum wastage, to achieve stated objectives.

**Electronic data interchange** The dedicated computer-to-computer exchange of information between the focal organisation and its key suppliers in order to build a responsive and agile supply chain.

**Emergent strategy** The strategy that comes into play because of sudden market development, rather than deliberate planning. For example, in response to a growing concern about women's safety, a taxi company launches a fleet of cabs that has women drivers and serves only women, and with this action, takes a large share of the women travellers from its rivals.

**Ethical supply chain** A supply chain that adopts non-exploitative social and environmental practices to source and deliver

its products. For example, boycotting suppliers who exploit children.

**Free on board (FOB) shipping point** An international commercial term that is a part of the buyer-seller agreement in international export and import activities. FOB refers to the fact that once the seller has delivered the goods to the buyer's choice of transport vehicle at the buyer's chosen port of shipment, the legal title of the goods passes to the buyer. After this stage is completed, the buyer is solely responsible for the delivery of goods, and any costs resulting from damage or loss.

**Globalisation** The liberal worldwide cross-border flow of goods, services, money and workforces. For example, a Chinese firm sets up a factory in Kenya and imports materials from Chile.

**Global sourcing** Obtaining supplies from overseas suppliers in order to get the maximum advantage of arbitrage opportunity. See Arbitrage opportunity.

**Goods** Tangible items that are bought by an organisation for production (raw material) or distribution (finished goods), and subsequently bought by customer for consumption. Also called products.

**Green reporting** An emerging area of financial accounting that expects organisations to report on aspects of their operations that have a direct impact on the environment. For example, the specific quantity of CO<sup>2</sup> (greenhouse gases) emission resulting from transportation. Also called sustainability reporting or environmental reporting.

**Inventory** An organisation's raw material, work-in-progress goods, and finished goods. Also called stock.

**Just-in-time (JIT)** A system of stock control that originated in Japan, based on the premise that the focal organisation can achieve significant cost savings if it adopts the partnership approach in its supplier relationships in order to get a reliable and accurate supply of material at the right time and right place. JIT eliminates costs associated with holding stock, and puts emphasis on quality.

**Lean manufacturing** A strategic approach to manufacturing that is driven by just-in-time stock control and some other approaches in order to achieve maximum cost efficiency and quality.

**Lean operations** Lean operations is the operations configuration that aims to achieve maximum cost efficiency by reducing or eliminating waste and cost of poor quality, and better materials management.

**Logistics** A set of activities in supply chain management with a specific focus on planning and executing the physical aspects of operations. For example, management of stock, transportation and warehousing,

**Logistics strategy** A strategy to ensure that the physical handling and movement of raw material and goods contributes to achieving operations and corporate objectives.

**M-business** The focal organisation's use of mobile phone apps to perform some of the operations activities. For example, a bank can provide instant approval of a personal loan due to swift verification of the applicant's credit record.

**Mass customisation** A mix of production and marketing strategies that are driven by customer requirements. It achieves the efficiency of standardised production, but adds unique value that is specific to each customer's needs. For example, producing standard MP3 players that are each engraved with a unique message requested by the customer at the time of sale.

**Multi-sourcing** A supply arrangement in which the focal organisation sources supplies from multiple Tier 1 suppliers in order to get the most competitive price and reduce the risk of non-supply of critical material.

**Niche** A very specific "slice" of the market that an organisation serves. For example, manufacturing tyres only for Formula One racing cars.

**Node** A point on a supply chain map that depicts upstream and downstream entities. For example, a key supplier is a node. As a result of its geographical diversity, a global supply network has greater node complexity.

**Operations** A system that includes activities and processes to source inputs from a chain of suppliers, transform inputs into outputs, and deliver the output to the market in a manner that satisfies customers' requirements.

**Operational** Activities that make an organisation function on a day-to-day basis.

**Operations strategy** An organisation's arrangement of operations resources and capabilities that is designed to make a direct and positive contribution to corporate objectives and business strategy. Operations managers consider other functional and business strategies when devising their operations strategy.

**Output** The intended tangible or intangible result obtained after transformed resources are transformed. For example, a cup of coffee.

**Pareto Analysis** a statistical technique in decision-making used for the selection of a limited number of tasks that produce a significant overall effect. It uses the Pareto Principle (also known as the 80/20 rule) – the idea that by doing 20% of the work you can generate 80% of the benefit of doing the entire job.

**Procurement** The function that includes purchasing goods and services strategically to make sure that the organisation gets maximum value from its purchases. A successful procurement function includes robust quality control of incoming goods and services.

**Purchasing** The act of buying products for the purpose of running operations or selling.

**Quality** The attributes of a good or a service that makes the customers perceive that the product/brand, or the organisation offering that product/brand, meets high standards and delivers value to its customers.

**Reverse logistics** The part of operations that has a backward flow from customers into the organisation. It includes product returns resulting from damage or other customer-related issues, and disposal of used products to achieve sustainability objectives.

**Shareholders** A group of people who invest money in an organisation and expect dividends at regular intervals.

**Single-sourcing** A supply arrangement in which the focal organisation deliberately builds a collaborative partnership-oriented supply chain with a single Tier 1 supplier.

**Supply chain** The seamless flow of material from the last tier of supplier into the transformation system and onto the final tier of customers as the result of the integrated activities carried out by the focal organisation at the centre of the chain.

**Supply network** The relatively longer and complex supply chain in which the suppliers can have multiple forward and backward relationships, which are not necessarily hierarchical, and therefore do not look straightforward on the supply map.

**Sustainable operations management**  
See Sustainable supply chain management

**Sustainable supply chain management**  
The practice of designing, planning and managing a network of upstream and downstream flow of material and information that takes into consideration profit, people and planet, the three Ps of sustainable operations.

**System** An arrangement of different parts that work together to achieve stated goals.

**Systems view** The approach to management that views the organisation as an integrated whole, comprised of many parts and functions that, when performing in unison, can achieve the organisation's objectives.

**Total quality management (TQM)** An organisation-wide approach to managing quality by creating greater awareness of the importance of doing the right things the first time. TQM views the workforce as the driver of quality, and is based on the theory that processes give quality output when staff understand the strategic significance of quality and its management.

**Tendering** The process of inviting tenders.

**Tender** A bid submitted by a supplier or potential supplier in response to the focal organisation's invitation. A tender is successful when the organisation chooses it over other tenders because of the quoted price and other terms of business.

**Third party logistics** The logistics provided by a specialised logistics firm, as an alternative to the focal organisation investing in the physical and managerial assets to perform the some or all of the logistics function in-house.

**Transformed resources** Inputs that undergo a transformation during operations to become an output. For example, coffee beans, sugar, milk are transformed into a cup of coffee.

**Transforming resources** Inputs that are used to transform the transformed resources into intended output. For example, a coffee machine and staff transform the coffee beans and milk into a cup of coffee.

**Upstream** The part of the supply chain that links the focal organisation to its suppliers.

**Value** The intrinsic worth of a product as perceived by the customer. Positive perception of value leads to customer loyalty.

**Value chain** An organisation's primary and support activities that have the potential to create superior value for its customers. Porter's generic framework identifies the primary activities as inbound logistics, operations, outbound logistics, marketing and sales, service, and identifies support activities as the organisation's infrastructure, human resources, technology development and procurement. If the organisation perceives that there is greater value in buying rather than doing a particular activity in-house, that activity may be outsourced (e.g. logistics, information technology services).

**Value system** The integration of the focal organisation's value chains and its suppliers. Supply chain strategy is based on the premise that the focal organisation can create superior value if its competitive strategy focuses on a value system approach instead of a value chain approach.

**Vertical integration** This is the integration of companies at different stages of production, such as a manufacturer owning the delivery service provider or the suppliers.