Key operations questions

Chapter 1 **Operations management**

- What is operations management?
- Why is operations management important in all types of organization?
- What is the input–transformation–output process?
- What is the process hierarchy?
- How do operations processes have different characteristics?
- What are the activities of operations management?

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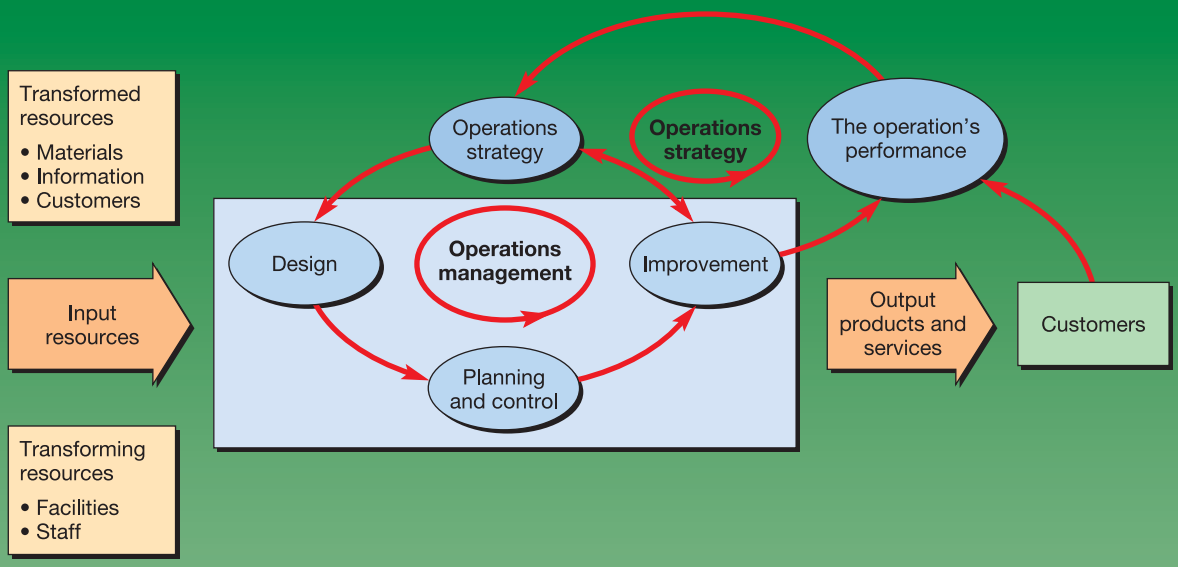
Part One

INTRODUCTION

This part of the book introduces the idea of the operations function in different types of organization. It identifies the common set of objectives to which operations managers aspire in order to serve their customers, and it explains how operations can have an important strategic role.



Chapter 1

Operations management

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- What is the input–transformation–output process?
- What is the process hierarchy?
- How do operations processes have different characteristics?
- What are the activities of operations management?

Introduction

Operations management is about how organizations produce goods and services. Everything you wear, eat, sit on, use, read or knock about on the sports field comes to you courtesy of the operations managers who organized its production. Every book you borrow from the library, every treatment you receive at the hospital, every service you expect in the shops and every lecture you attend at university – all have been produced. While the people who supervised their 'production' may not always be called operations managers that is what they really are. And that is what this book is concerned with – the tasks, issues and decisions of those operations managers who have made the services and products on which we all depend. This is an introductory chapter, so we will examine what we mean by 'operations management', how operations processes can be found everywhere, how they are all similar yet different, and what it is that operations managers do.

Operations in practice IKEA[1]

(All chapters start with an 'Operations in practice' example that illustrates some of the issues that will be covered in the chapter.)

Love it or hate it, IKEA is the most successful furniture retailer ever. With 276 stores in 36 countries, it has managed to develop its own special way of selling furniture. The stores' layout means customers often spend two hours in the store – far longer than in rival furniture retailers. IKEA's philosophy goes back to the original business, started in the 1950s in Sweden by Ingvar Kamprad. He built a showroom on the outskirts of Stockholm where land was cheap and simply displayed suppliers' furniture as it would be in a domestic setting. Increasing sales soon allowed IKEA to start ordering its own self-designed products from local manufacturers. But it was innovation in its operations that dramatically reduced its selling costs. These included the idea of selling furniture as self-assembly flat packs (which reduced production and transport costs) and its 'showroom–warehouse' concept which required customers to pick the furniture up themselves from the warehouse (which reduced retailing costs). Both of these operating principles are still the basis of IKEA's retail operations process today.

Stores are designed to facilitate the smooth flow of customers, from parking, moving through the store itself, to ordering and picking up goods. At the entrance to each store large notice-boards provide advice to shoppers. For young children, there is a supervised children's play area, a small cinema, and a parent and baby room so parents can leave their children in the supervised play area for a time. Parents are recalled via the loudspeaker system if the child has any problems. IKEA 'allow customers to make up their minds in their own time' but 'information points' have staff who can help. All furniture carries a ticket with a code number which indicates its location in the warehouse. (For larger items customers go to the information desks for assistance.) There is also an area where smaller items are displayed, and can be picked directly. Customers then pass through the warehouse where they pick up the items viewed in the showroom. Finally, customers pay at the checkouts, where a ramped conveyor belt moves purchases up to the checkout staff. The exit area has service points and a loading area that allows customers to bring their cars from the car park and load their purchases.

Behind the public face of IKEA's huge stores is a complex worldwide network of suppliers, 1,300 direct suppliers, about 10,000 sub-suppliers, wholesale and transport operations include 26 Distribution Centres. This supply network is vitally important to IKEA. From

Source: Alamy Images

purchasing raw materials, right through to finished products arriving in its customers' homes, IKEA relies on close partnerships with its suppliers to achieve both ongoing supply efficiency and new product development. However, IKEA closely controls all supply and development activities from IKEA's home town of Älmhult in Sweden.

But success brings its own problems and some customers became increasingly frustrated with overcrowding and long waiting times. In response IKEA in the UK launched a £150 m programme to 'design out' the bottlenecks. The changes included:

- Clearly marked in-store short cuts allowing customers who just want to visit one area, to avoid having to go through all the preceding areas.
- Express checkout tills for customers with a bag only rather than a trolley.
- Extra 'help staff' at key points to help customers.
- Redesign of the car parks, making them easier to navigate.
- Dropping the ban on taking trolleys out to the car parks for loading (originally implemented to stop vehicles being damaged).
- A new warehouse system to stop popular product lines running out during the day.
- More children's play areas.

IKEA spokeswoman Nicki Craddock said: *'We know people love our products but hate our shopping experience. We are being told that by customers every day, so we can't afford not to make changes. We realized a lot of people took offence at being herded like sheep on the long route around stores. Now if you know what you are looking for and just want to get in, grab it and get out, you can.'*

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Operations management is a vital part of IKEA's success

IKEA shows how important operations management is for its own success and the success of any type of organization. Of course, IKEA understands its market and its customers. But, just as important, it knows that the way it manages the network of operations that design, produce and deliver its products and services must be right for its market. No organization can survive in the long term if it cannot supply its customers effectively. And this is essentially what operations management is about – designing, producing and delivering products and services that satisfy market requirements. For any business, it is a vitally important activity. Consider just some of the activities that IKEA's operations managers are involved in.

- Arranging the store's layout to gives smooth and effective flow of customers (called process design)
- Designing stylish products that can be flat-packed efficiently (called product design)
- Making sure that all staff can contribute to the company's success (called job design)
- Locating stores of an appropriate size in the most effective place (called supply network design)
- Arranging for the delivery of products to stores (called supply chain management)
- Coping with fluctuations in demand (called capacity management)
- Maintaining cleanliness and safety of storage area (called failure prevention)
- Avoiding running out of products for sale (called inventory management)
- Monitoring and enhancing quality of service to customers (called quality management)
- Continually examining and improving operations practice (called operations improvement).

And these activities are only a small part of IKEA's total operations management effort. But they do give an indication, first of how operations management should contribute to the businesses success, and second, what would happen if IKEA's operations managers failed to be effective in carrying out any of its activities. Badly designed processes, inappropriate products, poor locations, disaffected staff, empty shelves, or forgetting the importance of continually improving quality, could all turn a previously successful organization into a failing one. Yet, although the relative importance of these activities will vary between different organizations, operations managers in all organizations will be making the same *type* of decision (even if *what* they actually decide is different).

What is operations management?

Operations management

Operations function

Operations management is the activity of managing the resources which produce and deliver products and services. The **operations function** is the part of the organization that is responsible for this activity. Every organization has an operations function because every organization produces some type of products and/or services. However, not all types of organization will necessarily call the operations function by this name. (Note that we also use the shorter terms 'the operation' and 'operations' interchangeably with the 'operations function').

Operations managers

Operations managers are the people who have particular responsibility for managing some, or all, of the resources which compose the operations function. Again, in some organizations the operations manager could be called by some other name. For example, he or she might be called the 'fleet manager' in a distribution company, the 'administrative manager' in a hospital, or the 'store manager' in a supermarket.

Operations in the organization

Three core functions

The operations function is central to the organization because it produces the goods and services which are its reason for existing, but it is not the only function. It is, however, one of the **three core functions** of any organization. These are:

- the marketing (including sales) function – which is responsible for *communicating* the organization's products and services to its markets in order to generate customer requests for service;

- the product/service development function – which is responsible for *creating* new and modified products and services in order to generate future customer requests for service;
- the operations function – which is responsible for *fulfilling* customer requests for service through the production and delivery of products and services.

Support functions

In addition, there are the **support functions** which enable the core functions to operate effectively. These include, for example:

- the accounting and finance function – which provides the information to help economic decision-making and manages the financial resources of the organization;
- the human resources function – which recruits and develops the organization's staff as well as looking after their welfare.

Remember that different organizations will call their various functions by different names and will have a different set of support functions. Almost all organizations, however, will have the three core functions, because all organizations have a fundamental need to sell their services, satisfy their customers and create the means to satisfy customers in the future. Table 1.1 shows the activities of the three core functions for a sample of organizations.

Broad definition of operations

In practice, there is not always a clear division between the three core functions or between core and support functions. This leads to some confusion over where the boundaries of the operations function should be drawn. In this book we use a relatively **broad definition of operations**. We treat much of the product/service development, technical and information systems activities and some of the human resource, marketing, and accounting and finance activities as coming within the sphere of operations management. We view the operations function as comprising all the activities necessary for the day-to-day fulfilment of customer requests. This includes sourcing products and services from suppliers and transporting products and services to customers.

Working effectively with the other parts of the organization is one of the most important responsibilities of operations management. It is a fundamental of modern management that functional boundaries should not hinder efficient internal processes. Figure 1.1 illustrates some of the relationships between operations and some other functions in terms of the flow of information between them. Although it is not comprehensive, it gives an idea of the nature of each relationship. However, note that the support functions have a different relationship with operations than operations has with the other core functions. Operations management's responsibility to support functions is primarily to make sure that they understand operations' needs and help them to satisfy these needs. The relationship with the other two core functions is more equal – less of *'this is what we want'* and more *'this is what we can do currently – how do we reconcile this with broader business needs?'*

Table 1.1 The activities of core functions in some organizations

Core functional activities	*Internet service provider (ISP)*	*Fast food chain*	*International aid charity*	*Furniture manufacturer*
Marketing and sales	Promote services to users and get registrations Sell advertising space	Advertise on TV Devise promotional materials	Develop funding contracts Mail out appeals for donations	Advertise in magazines Determine pricing policy Sell to stores
Product/service development	Devise new services and commission new information content	Design hamburgers, pizzas, etc. Design décor for restaurants	Develop new appeals campaigns Design new assistance programmes	Design new furniture Coordinate with fashionable colours
Operations	Maintain hardware, software and content Implement new links and services	Make burgers, pizzas etc. Serve customers Clear away Maintain equipment	Give service to the beneficiaries of the charity	Make components Assemble furniture

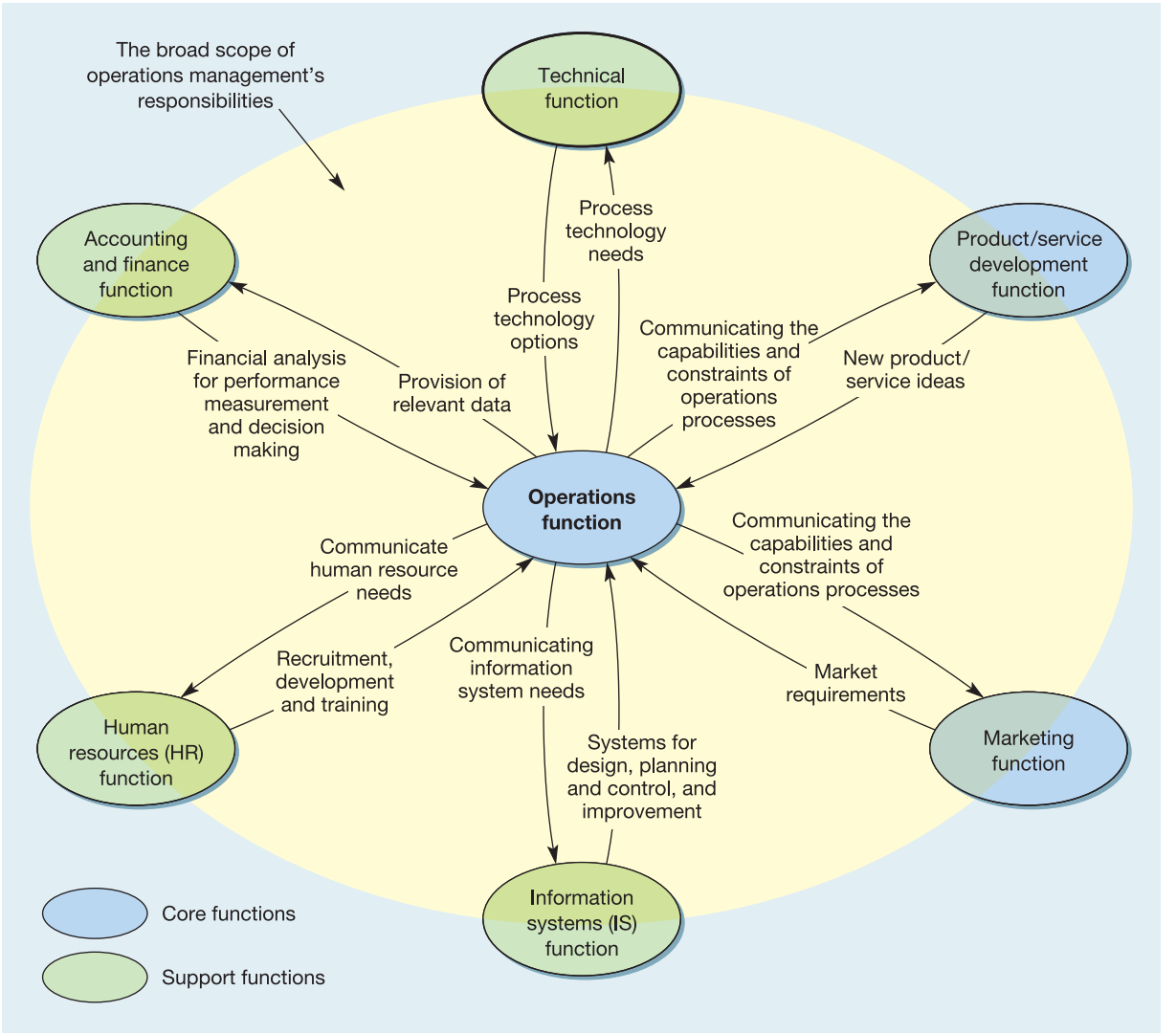

Figure 1.1 The relationship between the operations function and other core and support functions of the organization

Operations management is important in all types of organization

In some types of organization it is relatively easy to visualize the operations function and what it does, even if we have never seen it. For example, most people have seen images of automobile assembly. But what about an advertising agency? We know vaguely what they do – they produce the advertisements that we see in magazines and on television – but what is their operations function? The clue lies in the word 'produce'. Any business that produces something, whether tangible or not, must use resources to do so, and so must have an operations activity. Also the automobile plant and the advertising agency do have one important element in common: both have a higher objective – to make a profit from producing their products or services. Yet not-for-profit organizations also use their resources to produce services, not to make a profit, but to serve society in some way. Look at the following examples of what operations management does in five very different organizations and some common themes emerge.

Source: Rex Features

Automobile assembly factory – *Operations management uses machines to efficiently assemble products that satisfy current customer demands*

Source: Getty Images

Physician (general practitioner) – *Operations management uses knowledge to effectively diagnose conditions in order to treat real and perceived patient concerns*

Source: Alamy Images

Management consultant – *Operations management uses people to effectively create the services that will address current and potential client needs*

Source: Corbis

Disaster relief charity – *Operations management uses our and our partners' resources to speedily provide the supplies and services that relieve community suffering*

Source: Alamy Images

Advertising agency – *Operations management uses our staff's knowledge and experience to creatively present ideas that delight clients and address their real needs*

Start with the statement from the 'easy to visualize' automobile plant. Its summary of what operations management did was that . . . '*Operations management uses machines to efficiently assemble products that satisfy current customer demands.*' The statements from the other organizations were similar, but used slightly different language. Operations management used, not just machines but also . . . '*knowledge, people, "our and our partners' resources"*' and '*our staff's experience and knowledge*', to *efficiently* (or *effectively*, or *creatively*) *assemble* (or *produce, change, sell, move, cure, shape,* etc.) *products* (or *services* or *ideas*) *that satisfy* (or *match* or *exceed* or *delight*) *customers*' (or *clients*' or *citizens*' or *society's*) *demands* (or *needs* or *concerns* or even *dreams*). So whatever terminology is used there is a common theme and a common purpose to how we can visualize the operations activity in any type of organization: small or large, manufacturing or service, public or private, profit or not-for-profit. Operations management uses *resources* to *appropriately create outputs* that *fulfil defined market requirements. See* Figure 1.2. However, although the essential nature and purpose of operations management is the same in every type of organization, there are some special issues to consider, particularly in smaller organizations and those whose purpose is to maximize something other than profit.

Operations management uses . . .

resources		appropriately	create	outputs		fulfil	defined	market	requirements
			produce						
experience			change				potential	citizens'	
people		effectively	sell	ideas		match	perceived	client	dreams
machines	to	efficiently	assemble	products	that	satisfy	current	customer	demands
knowledge		creatively	move	services		exceed	emerging	society	needs
partners		etc.	cure	etc.		delight	real	etc.	concerns
etc.			shape			etc.	etc.		etc.
			etc.						

Figure 1.2 Operations management uses resources to appropriately create outputs that fulfil defined market requirements

Operations management in the smaller organization

The role of operations management in smaller organizations often overlaps significantly with other functions

Operations management is just as important in small organizations as it is in large ones. Irrespective of their size, all companies need to produce and deliver their products and services efficiently and effectively. However, in practice, managing operations in a small or medium-size organization has its own set of problems. Large companies may have the resources to dedicate individuals to specialized tasks but smaller companies often cannot, so people may have to do different jobs as the need arises. Such an informal structure can allow the company to respond quickly as opportunities or problems present themselves. But decision making can also become confused as individuals' roles overlap. Small companies may have exactly the same operations management issues as large ones but they can be more difficult to separate from the mass of other issues in the organization. However, small operations can also have significant advantages; the short case on Acme Whistles illustrates this.

Short case
Acme Whistles[2]

Acme Whistles can trace its history back to 1870 when Joseph Hudson decided he had the answer to the London Metropolitan Police's request for something to replace the wooden rattles that were used to sound the alarm. So the world's first police whistle was born. Soon Acme grew to be the premier supplier of whistles for police forces around the world. *'In many ways'*, says Simon Topman, owner and Managing Director of the company, *'the company is very much the same as it was in Joseph's day. The machinery is more modern, of course, and we have a wider variety of products, but many of our products are similar to their predecessors. For example, football referees seem to prefer the traditional snail-shaped whistle. So, although we have dramatically improved the performance of the product, our customers want it to look the same. We have also*

Source: Simon Topman/Acme Whistles

maintained the same manufacturing tradition from those early days. The original owner insisted on personally blowing every single whistle before it left the factory. We still do the same, not by personally blowing them, but by using an air line, so the same tradition of quality has endured.'

The company's range of whistles has expanded to include sports whistles (they provide the whistles for the soccer World Cup), distress whistles, (silent) dog whistles, novelty whistles, instrumental whistles (used by all of the world's top orchestras), and many more types. *'We are always trying to improve our products',* says Simon, *'it's a business of constant innovation. Sometimes I think that after 130 years surely there is nothing more to do, but we always find some new feature to incorporate. Of course, managing the operations in a small company is very different to working in a large one. Everyone has much broader jobs; we cannot afford the overheads of having specialist people in specialized roles. But this relative informality has a lot of advantages. It means that we can maintain our philosophy of quality amongst everybody in the company, and it means that we can react very quickly when the market demands it.'* Nor is the company's small size any barrier to its ability to innovate. *'On the contrary'*, says Simon, *'there is something about the culture of the company that is extremely important in fostering innovation. Because we are small we all know each other and we all want to contribute something to the company. It is not uncommon for employees to figure out new ideas for different types of whistle. If an idea looks promising, we will put a small and informal team together to look at it further. It is not unusual for people who have been with us only a few months to start wanting to make innovations. It's as though something happens to them when they walk through the door of the factory that encourages their natural inventiveness.'*

Operations management in not-for-profit organizations

Operations decisions are the same in commercial and not-for-profit organizations

Terms such as *competitive advantage*, *markets* and *business*, which are used in this book, are usually associated with companies in the for-profit sector. Yet operations management is also relevant to organizations whose purpose is not primarily to earn profits. Managing the operations in an animal welfare charity, hospital, research organization or government department is essentially the same as in commercial organizations. **Operations have to take the same decisions** – how to produce products and services, invest in technology, contract out some of their activities, devise performance measures, and improve their operations performance and so on. However, the strategic objectives of not-for-profit organizations may be more complex and involve a mixture of political, economic, social and environmental objectives. Because of this there may be a greater chance of operations decisions being made under conditions of conflicting objectives. So, for example, it is the operations staff in a children's welfare department who have to face the conflict between the cost of providing extra social workers and the risk of a child not receiving adequate protection. Nevertheless the vast majority of the topics covered in this book have relevance to all types of organization, including non-profit, even if the context is different and some terms may have to be adapted.

Short case
Oxfam International[3]

Oxfam International is a confederation of 13 like-minded organizations based around the world that, together with partners and allies, work directly with communities seeking to ensure that poor people can improve their lives and livelihoods and have a say in decisions that affect them. With an annual expenditure that exceeds US$700 million, Oxfam International focuses its efforts in several areas, including development work, long-term programmes to eradicate poverty and

Source: Rex Features

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combat injustice, emergency relief delivering immediate life-saving assistance to people affected by natural disasters or conflict, helping to build their resilience to future disasters, campaigning and raising public awareness of the causes of poverty, encouraging ordinary people to take action for a fairer world, and advocacy and research that pressures decision-makers to change policies and practices that reinforce poverty and injustice.

All of Oxfam International's activities depend on effective and professional operations management. For example, Oxfam's network of charity shops, run by volunteers, is a key source of income. The shops sell donated items and handcrafts from around the world giving small-scale producers fair prices, training, advice and funding. Supply chain management and development is just as central to the running of these shops as it is to the biggest commercial chain of stores. The operations challenges involved in Oxfam's ongoing 'Clean Water' exercise are different but certainly no less important. Around 80 per cent of diseases and over one-third of deaths in the developing world are caused by contaminated water and Oxfam has a particular expertise in providing clean water and sanitation facilities. The better their coordinated efforts of identifying potential projects, working with local communities, providing help and education, and helping to providing civil engineering expertise, the more effective Oxfam is at fulfilling its objectives.

More dramatically, Oxfam International's response to emergency situations, providing humanitarian aid where it is needed, must be fast, appropriate and efficient. Whether the disasters are natural or political, they become emergencies when the people involved can no longer cope. In such situations, Oxfam, through its network of staff in local offices, is able to advise on what and where help is needed. Indeed, local teams are often able to provide warnings of impending disasters, giving more time to assess needs and coordinate a multi-agency response. The organization's headquarters in Oxford in the UK provides advice, materials and staff, often deploying emergency support staff on short-term assignments. Shelters, blankets and clothing can be flown out at short notice from the Emergencies Warehouse. Engineers and sanitation equipment can also be provided, including water tanks, latrines, hygiene kits and containers. When an emergency is over, Oxfam continues to work with the affected communities through their local offices to help people rebuild their lives and livelihoods. In an effort to improve the timeliness, effectiveness and appropriateness of its response to emergencies, Oxfam recently adopted a more systematic approach to evaluating the successes and failures of its humanitarian work. Real-time evaluations, which seek to assess and influence emergency response programmes in their early stages, were implemented during the response to floods in Mozambique and South Asia, the earthquake in Peru, Hurricane Felix in Nicaragua and the conflicts in Uganda. These exercises provided Oxfam's humanitarian teams with the opportunity to gauge the effectiveness of their response, and make crucial adjustments at an early stage if necessary. The evaluations highlighted several potential improvements. For example, it became evident that there was a need to improve preparation ahead of emergencies, as well as the need to develop more effective coordination planning tools. It was also decided that adopting a common working approach with shared standards would improve the effectiveness of their response to emergencies. Oxfam also emphasizes the importance of the role played by local partners in emergencies. They are often closer to, and more in tune with, affected communities, but may require additional support and empowerment to scale up their response and comply with the international humanitarian standards.

The new operations agenda

Modern business pressures have changed the operations agenda

The business environment has a significant impact on what is expected from operations management. In recent years there have been new pressures for which the operations function has needed to develop responses. Table 1.2 lists some of these **business pressures** and the operations responses to them. These operations responses form a major part of a *new agenda* for operations. Parts of this agenda are trends which have always existed but have accelerated, such as globalization and increased cost pressures. Part of the agenda involves seeking ways to exploit new technologies, most notably the Internet. Of course, the list in Table 1.2 is not comprehensive, nor is it universal. But very few businesses will be unaffected by at least some of these concerns. When businesses have to cope with a more challenging environment, they look to their operations function to help them respond.

Table 1.2 Changes in the business environment are shaping a new operations agenda

The business environment is changing . . .	*Prompting operations responses . . .*
For example, • Increased cost-based competition • Higher quality expectations • Demands for better service • More choice and variety • Rapidly developing technologies • Frequent new product/service introduction • Increased ethical sensitivity • Environmental impacts are more transparent • More legal regulation • Greater security awareness	For example, • Globalization of operations networking • Information-based technologies • Internet-based integration of operations activities • Supply chain management • Customer relationship management • Flexible working patterns • Mass customization • Fast time-to-market methods • Lean process design • Environmentally sensitive design • Supplier 'partnership' and development • Failure analysis • Business recovery planning

The input–transformation–output process

Transformation process model

Input resources

Outputs of goods and services

All operations produce products and services by changing *inputs* into *outputs* using an 'input-transformation-output' process. Figure 1.3 shows this general **transformation process model**. Put simply, operations are processes that take in a set of **input resources** which are used to transform something, or are transformed themselves, into **outputs of products and services**. And although all operations conform to this general input–transformation–output model, they differ in the nature of their specific inputs and outputs. For example, if you stand far enough away from a hospital or a car plant, they might look very similar, but move closer and clear differences do start to emerge. One is a manufacturing operation producing 'products', and the other is a service operation producing 'services' that change the physiological or psychological condition of patients. What is inside each operation will also be

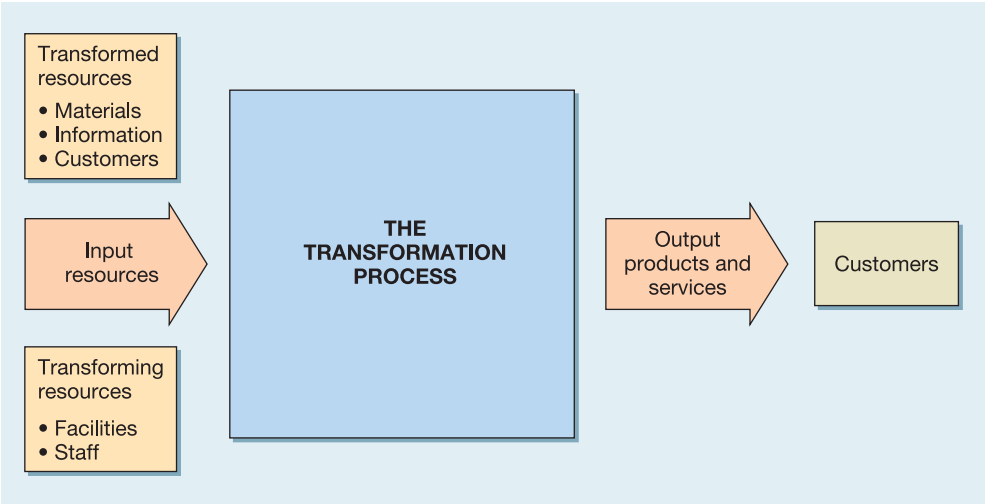

Figure 1.3 All operations are input–transformation–output processes

different. The motor vehicle plant contains metal-forming machinery and assembly processes, whereas the hospital contains diagnostic, care and therapeutic processes. Perhaps the most important difference between the two operations, however, is the nature of their inputs. The vehicle plant transforms steel, plastic, cloth, tyres and other materials into vehicles. The hospital transforms the customers themselves. The patients form part of the input to, and the output from, the operation. This has important implications for how the operation needs to be managed.

Inputs to the process

Transformed resources

One set of inputs to any operation's processes are **transformed resources**. These are the resources that are treated, transformed or converted in the process. They are usually a mixture of the following:

- **Materials** – operations which process materials could do so to transform their *physical properties* (shape or composition, for example). Most manufacturing operations are like this. Other operations process materials to change their *location* (parcel delivery companies, for example). Some, like retail operations, do so to change the *possession* of the materials. Finally, some operations *store* materials, such as in warehouses.
- **Information** – operations which process information could do so to transform their *informational properties* (that is the purpose or form of the information); accountants do this. Some change the *possession* of the information, for example market research companies sell information. Some *store* the information, for example archives and libraries. Finally, some operations, such as telecommunication companies, change the *location* of the information.
- **Customers** – operations which process customers might change their *physical properties* in a similar way to materials processors: for example, hairdressers or cosmetic surgeons. Some *store* (or more politely *accommodate*) customers: hotels, for example. Airlines, mass rapid transport systems and bus companies transform the *location* of their customers, while hospitals transform their *physiological state.* Some are concerned with transforming their *psychological state*, for example most entertainment services such as music, theatre, television, radio and theme parks.

Material inputs
Customer inputs
Information inputs

Often one of these is dominant in an operation. For example, a bank devotes part of its energies to producing printed statements of accounts for its customers. In doing so, it is processing **inputs of material** but no one would claim that a bank is a printer. The bank is also concerned with processing **inputs of customers**. It gives them advice regarding their financial affairs, cashes their cheques, deposits their cash, and has direct contact with them. However, most of the bank's activities are concerned with processing **inputs of information** about its customers' financial affairs. As customers, we may be unhappy with badly printed statements and we may be unhappy if we are not treated appropriately in the bank. But if the bank makes errors in our financial transactions, we suffer in a far more fundamental way. Table 1.3 gives examples of operations with their dominant transformed resources.

Table 1.3 Dominant transformed resource inputs of various operations

Predominantly processing inputs of materials	*Predominantly processing inputs of information*	*Predominantly processing inputs of customers*
All manufacturing operations	Accountants	Hairdressers
Mining companies	Bank headquarters	Hotels
Retail operations	Market research company	Hospitals
Warehouses	Financial analysts	Mass rapid transport
Postal services	News service	Theatres
Container shipping line	University research unit	Theme parks
Trucking companies	Telecoms company	Dentists

Transforming resources

The other set of inputs to any operations process are **transforming resources**. These are the resources which act upon the transformed resources. There are two types which form the 'building blocks' of all operations:

Facilities
Staff

- **facilities** – the buildings, equipment, plant and process technology of the operation;
- **staff** – the people who operate, maintain, plan and manage the operation. (Note that we use the term 'staff' to describe all the people in the operation, at any level.)

The exact nature of both facilities and staff will differ between operations. To a five-star hotel, its facilities consist mainly of 'low-tech' buildings, furniture and fittings. To a nuclear-powered aircraft carrier, its facilities are 'high-tech' nuclear generators and sophisticated electronic equipment. Staff will also differ between operations. Most staff employed in a factory assembling domestic refrigerators may not need a very high level of technical skill. In contrast, most staff employed by an accounting company are, hopefully, highly skilled in their own particular 'technical' skill (accounting). Yet although skills vary, all staff can make a contribution. An assembly worker who consistently misassembles refrigerators will dissatisfy customers and increase costs just as surely as an accountant who cannot add up. The balance between facilities and staff also varies. A computer chip manufacturing company, such as Intel, will have significant investment in physical facilities. A single chip fabrication plant can cost in excess of $4 billion, so operations managers will spend a lot of their time managing their facilities. Conversely, a management consultancy firm depends largely on the quality of its staff. Here operations management is largely concerned with the development and deployment of consultant skills and knowledge.

Outputs from the process

Tangibility

Although products and services are different, the distinction can be subtle. Perhaps the most obvious difference is in their respective **tangibility**. Products are usually tangible. You can physically touch a television set or a newspaper. Services are usually intangible. You cannot touch consultancy advice or a haircut (although you can often see or feel the results of these services). Also, services may have a shorter stored life. Products can usually be stored, at least for a time. The life of a service is often much shorter. For example, the service of 'accommodation in a hotel room for tonight' will perish if it is not sold before tonight – accommodation in the same room tomorrow is a different service.

Most operations produce both products and services

'Pure' products
'Pure' service

Some operations produce just products and others just services, but most operations produce a mixture of the two. Figure 1.4 shows a number of operations (including some described as examples in this chapter) positioned in a spectrum from **'pure' product** producers to **'pure' service** producers. Crude oil producers are concerned almost exclusively with the product which comes from their oil wells. So are aluminium smelters, but they might also produce some services such as technical advice. Services produced in these circumstances

Facilitating services

are called **facilitating services**. To an even greater extent, machine tool manufacturers produce facilitating services such as technical advice and applications engineering. The services produced by a restaurant are an essential part of what the customer is paying for. It is both a manufacturing operation which produces meals and a provider of service in the advice, ambience and service of the food. An information systems provider may produce software

Facilitating products

'products', but primarily it is providing a service to its customers, with **facilitating products**. Certainly, a management consultancy, although it produces reports and documents, would see itself primarily as a service provider. Finally, pure services produce no products, a psychotherapy clinic, for example. Of the short cases and examples in this chapter, Acme Whistles is primarily a product producer, although it can give advice or it can even design products for individual customers. Pret A Manger both manufactures and serves its sandwiches to customers. IKEA subcontracts the manufacturing of its products before selling them, and also offers some design services. It therefore has an even higher service content.

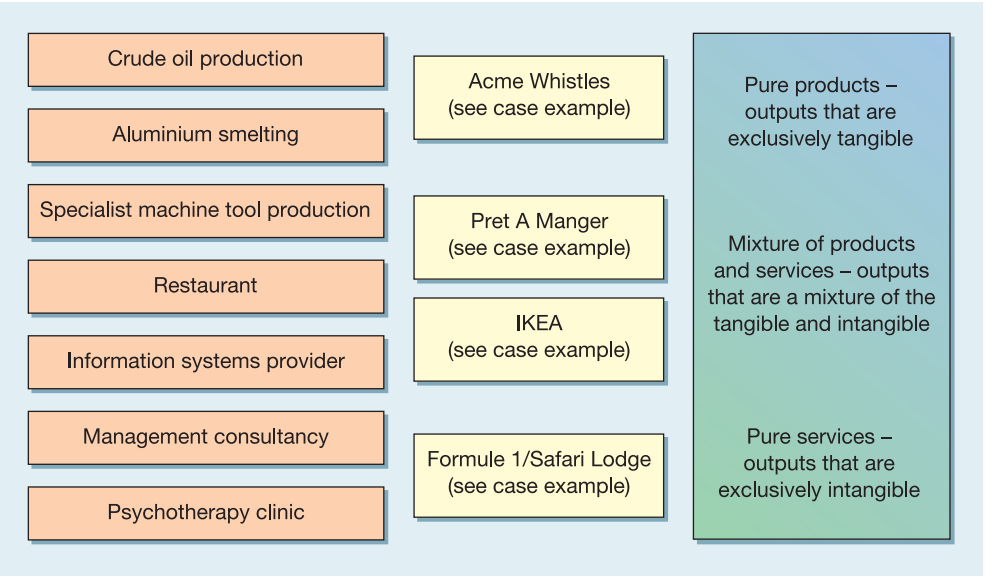

Figure 1.4 The output from most types of operation is a mixture of goods and services

Formule 1 and the safari park (see later) are close to being pure services, although they both have some tangible elements such as food.

Services and products are merging

Increasingly the distinction between services and products is both difficult to define and not particularly useful. Information and communications technologies are even overcoming some of the consequences of the intangibility of services. Internet-based retailers, for example, are increasingly 'transporting' a larger proportion of their services into customers' homes. Even the official statistics compiled by governments have difficulty in separating products and services. Software sold on a disc is classified as a product. The same software sold over the Internet is a service. Some authorities see the essential purpose of all businesses, and therefore operations processes, as being to 'service customers'. Therefore, they argue, **all operations are service providers** which may produce products as a part of serving their customers. Our approach in this book is close to this. We treat operations management as being important for all organizations. Whether they see themselves as manufacturers or service providers is very much a secondary issue.

All operations are service providers

Short case
Pret A Manger[4]

Described by the press as having *'revolutionized the concept of sandwich making and eating'*, Pret A Manger opened their first shop in the mid-1980s, in London. Now they have over 130 shops in UK, New York, Hong Kong and Tokyo. They say that their secret is to focus continually on quality – not just of their food, but in every aspect of their operations practice. They go to extraordinary lengths to avoid the chemicals and preservatives common in most 'fast' food, say the

Source: Alamy Images

company. *'Many food retailers focus on extending the shelf life of their food, but that's of no interest to us. We maintain our edge by selling food that simply can't be beaten for freshness. At the end of the day, we give whatever we haven't sold to charity to help feed those who would otherwise go hungry. When we were just starting out, a big supplier tried to sell us coleslaw that lasted sixteen days. Can you imagine! Salad that lasts sixteen days? There and then we decided Pret would stick to wholesome fresh food – natural stuff. We have not changed that policy.'*

The first Pret A Manger shop had its own kitchen where fresh ingredients were delivered first thing every morning, and food was prepared throughout the day. Every Pret shop since has followed this model. The team members serving on the tills at lunchtime will have been making sandwiches in the kitchen that morning. The company rejected the idea of a huge centralized sandwich factory even though it could significantly reduce costs. Pret also own and manage all their shops directly so that they can ensure consistently high standards in all their shops. *'We are determined never to forget that our hard-working people make all the difference. They are our heart and soul. When they care, our business is sound. If they cease to care, our business goes down the drain. In a retail sector where high staff turnover is normal, we're pleased to say our people are much more likely to stay around! We work hard at building great teams. We take our reward schemes and career opportunities very seriously. We don't work nights (generally), we wear jeans, we party!'* Customer feedback is regarded as being particularly important at Pret. Examining customers' comments for improvement ideas is a key part of weekly management meetings, and of the daily team briefs in each shop.

The processes hierarchy

So far we have discussed operations management, and the input–transformation–output model, at the level of 'the operation'. For example, we have described 'the whistle factory', 'the sandwich shop', 'the disaster relief operation', and so on. But look inside any of these operations. One will see that all operations consist of a collection of processes (though these processes may be called 'units' or 'departments') interconnecting with each other to form a network. Each process acts as a smaller version of the whole operation of which it forms a part, and transformed resources flow between them. In fact within any operation, the mechanisms that actually transform inputs into outputs are these **processes**. A process is 'an arrangement of resources that produce some mixture of products and services'. They are the 'building blocks' of all operations, and they form an 'internal network' within an operation.

Processes

Each process is, at the same time, an **internal supplier** and an **internal customer** for other processes. This 'internal customer' concept provides a model to analyse the internal activities of an operation. It is also a useful reminder that, by treating internal customers with the same degree of care as external customers, the effectiveness of the whole operation can be improved. Table 1.4 illustrates how a wide range of operations can be described in this way.

Internal supplier

Internal customer

Within each of these processes is another network of individual units of resource such as individual people and individual items of process technology (machines, computers, storage facilities, etc.). Again, transformed resources flow between each unit of transforming resource. So any business, or operation, is made up of a network of processes and any process is made up of a network of resources. But also any business or operation can itself be viewed as part of a greater network of businesses or operations. It will have operations that supply it with the products and services it needs and unless it deals directly with the end-consumer, it will supply customers who themselves may go on to supply their own customers. Moreover, any operation could have several suppliers and several customers and may be in competition with other operations producing similar services to those it produces itself. This network of operations is called the **supply network**. In this way the input–transformation–output model can be used at a number of different 'levels of analysis'. Here we have used the idea to **analyse businesses at three levels**, the process, the operation and the supply network. But one could define many different 'levels of analysis', moving upwards from small to larger processes, right up to the huge supply network that describes a whole industry.

Supply network

Operations can be analysed at three levels

Table 1.4 Some operations described in terms of their processes

Operation	*Some of the operation's inputs*	*Some of the operation's processes*	*Some of the operation's outputs*
Airline	Aircraft Pilots and air crew Ground crew Passengers and freight	Check passengers in Board passengers Fly passengers and freight around the world Care for passengers	Transported passengers and freight
Department store	Goods for sale Sales staff Information systems Customers	Source and store goods Display goods Give sales advice Sell goods	Customers and goods 'assembled' together
Police	Police officers Computer systems Information systems Public (law-abiding and criminals)	Crime prevention Crime detection Information gathering Detaining suspects	Lawful society, public with a feeling of security
Frozen food manufacturer	Fresh food Operators Processing technology Cold storage facilities	Source raw materials Prepare food Freeze food Pack and freeze food	Frozen food

Hierarchy of operations

This idea is called the **hierarchy of operations** and is illustrated for a business that makes television programmes and videos in Figure 1.5. It will have inputs of production, technical and administrative staff, cameras, lighting, sound and recording equipment, and so on. It transforms these into finished programmes, music, videos, etc. At a more macro level, the business itself is part of a whole supply network, acquiring services from creative agencies, casting agencies and studios, liaising with promotion agencies, and serving its broadcasting company customers. At a more micro level within this overall operation there are many individual processes: workshops manufacturing the sets; marketing processes that liaise with potential customers; maintenance and repair processes that care for, modify and design technical equipment; production units that shoot the programmes and videos; and so on. Each of these individual processes can be represented as a network of yet smaller processes, or even individual units of resource. So, for example, the set manufacturing process could consist of four smaller processes: one that designs the sets, one that constructs them, one that acquires the props, and one that finishes (paints) the set.

Critical commentary

The idea of the internal network of processes is seen by some as being over-simplistic. In reality the relationship between groups and individuals is significantly more complex than that between commercial entities. One cannot treat internal customers and suppliers exactly as we do external customers and suppliers. External customers and suppliers usually operate in a free market. If an organization believes that in the long run it can get a better deal by purchasing goods and services from another supplier, it will do so. But internal customers and suppliers are not in a 'free market'. They cannot usually look outside either to purchase input resources or to sell their output goods and services (although some organizations are moving this way). Rather than take the 'economic' perspective of external commercial relationships, models from organizational behaviour, it is argued, are more appropriate.

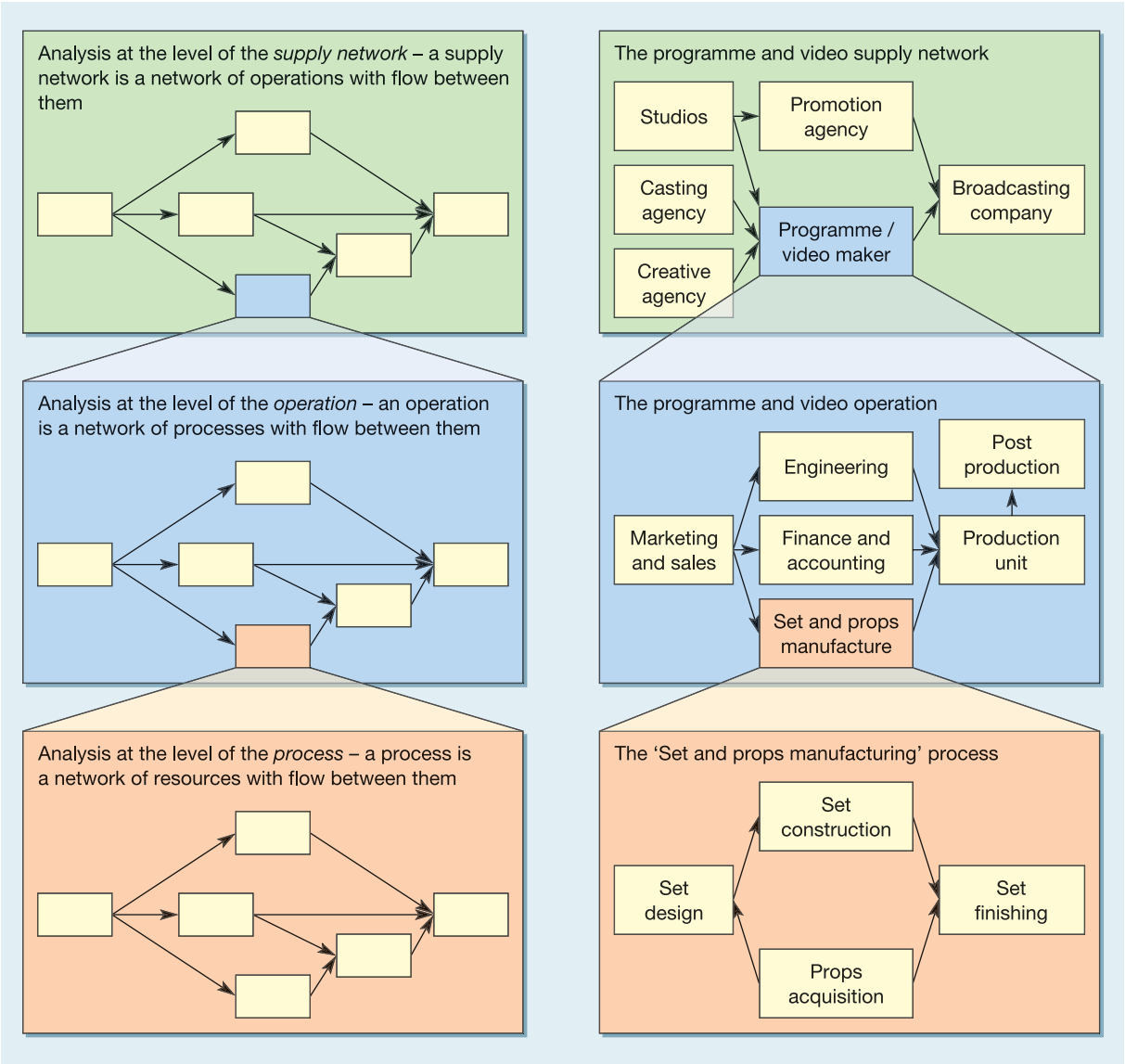

Figure 1.5 Operations and process management requires analysis at three levels: the supply network, the operation, and the process

Operations management is relevant to all parts of the business

All functions manage processes

The example in Figure 1.5 demonstrates that it is not just the operations function that manages processes; **all functions manage processes**. For example, the marketing function will have processes that produce demand forecasts, processes that produce advertising campaigns and processes that produce marketing plans. These processes in the other functions also need managing using similar principles to those within the operations function. Each function will have its 'technical' knowledge. In marketing, this is the expertise in designing and shaping marketing plans; in finance, it is the technical knowledge of financial reporting. Yet each will also have a 'process management' role of producing plans, policies, reports and services. The implications of this are very important. Because all managers have some responsibility for managing processes, they are, to some extent, operations managers. They all should want to give good service to their (often internal) customers, and they all will

Table 1.5 Some examples of processes in non-operations functions

Organizational function	*Some of its processes*	*Outputs from its process*	*Customer(s) for its outputs*
Marketing and sales	Planning process	Marketing plans	Senior management
	Forecasting process	Sales forecasts	Sales staff, planners, operations
	Order taking process	Confirmed orders	Operations, finance
Finance and accounting	Budgeting process	Budgets	Everyone
	Capital approval processes	Capital request evaluations	Senior management, requesters
	Invoicing processes	Invoices	External customers
Human resources management	Payroll processes	Salary statements	Employees
	Recruitment processes	New hires	All other processes
	Training processes	Trained employees	All other processes
Information technology	Systems review process	System evaluation	All other processes
	Help desk process	Advice	All other processes
	System implementation project processes	Implemented working systems and aftercare	All other processes

All managers, not just operations managers, manage processes

want to do this efficiently. So, **operations management is relevant for all functions**, and all managers should have something to learn from the principles, concepts, approaches and techniques of operations management. It also means that we must distinguish between two meanings of 'operations':

Operations as a function

- **'Operations' as a function**, meaning the part of the organization which produces the products and services for the organization's external customers;

Operations as an activity

- **'Operations' as an activity**, meaning the management of the processes within any of the organization's functions.

Table 1.5 illustrates just some of the processes that are contained within some of the more common non-operations functions, the outputs from these processes and their 'customers'.

Business processes

Whenever a business attempts to satisfy its customers' needs it will use many processes, in both its operations and its other functions. Each of these processes will contribute some part to fulfilling customer needs. For example, the television programme and video production company, described previously, produces two types of 'product'. Both of these products involve a slightly different mix of processes within the company. The company decides to re-organize its operations so that each product is produced from start to finish by a dedicated process that contains all the elements necessary for its production, as in Figure 1.6. So customer needs for each product are entirely fulfilled from within what is called an **'end-to-end' business process**. These often cut across conventional organizational boundaries. Reorganizing (or 're-engineering') process boundaries and organizational responsibilities around these business processes is the philosophy behind **business process re-engineering** (BPR) which is discussed further in Chapter 18.

'End-to-end' business processes

Business process re-engineering

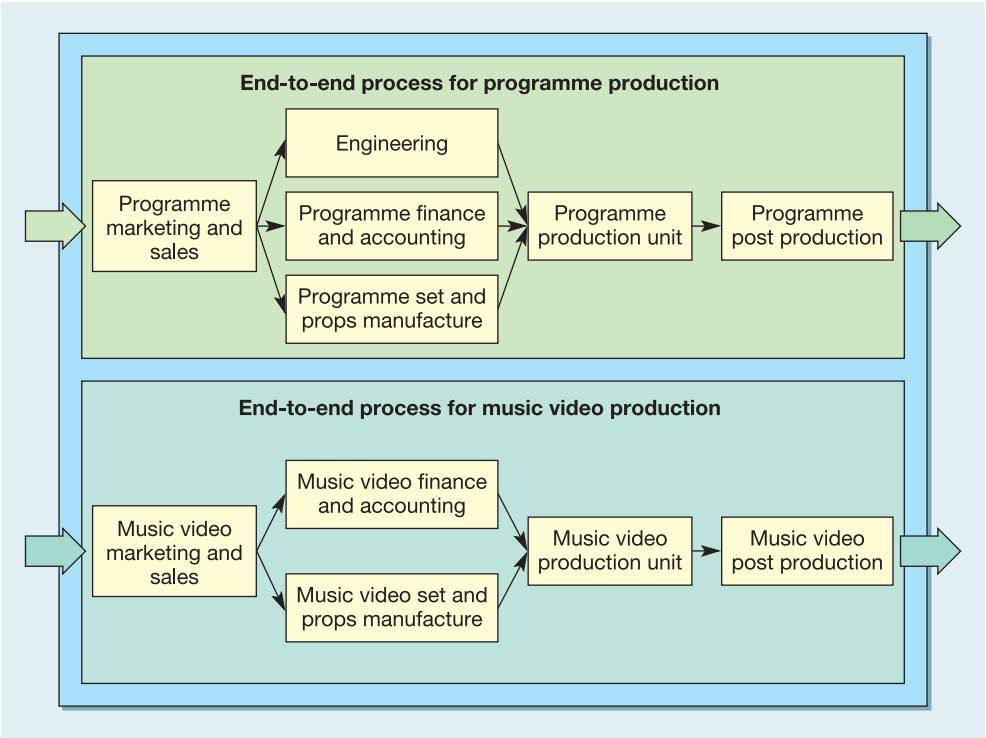

Figure 1.6 The television and video company divided into two 'end-to-end' business processes, one dedicated to producing programmes and the other dedicated to producing music videos

Operations processes have different characteristics

Although all operations processes are similar in that they all transform inputs, they do differ in a number of ways, four of which, known as the four Vs, are particularly important:

Volume
Variety
Variation
Visibility

- The **volume** of their output;
- The **variety** of their output;
- The **variation** in the demand for their output;
- The degree of **visibility** which customers have of the production of their output.

The volume dimension

Repeatability
Systematization

Let us take a familiar example. The epitome of high-volume hamburger production is McDonald's, which serves millions of burgers around the world every day. Volume has important implications for the way McDonald's operations are organized. The first thing you notice is the **repeatability** of the tasks people are doing and the **systematization** of the work where standard procedures are set down specifying how each part of the job should be carried out. Also, because tasks are systematized and repeated, it is worthwhile developing specialized fryers and ovens. All this gives *low unit costs*. Now consider a small local cafeteria serving a few 'short-order' dishes. The range of items on the menu may be similar to the larger operation, but the volume will be far lower, so the repetition will also be far lower and the number of staff will be lower (possibly only one person) and therefore individual staff are likely to perform a wider range of tasks. This may be more rewarding for the staff, but less open to systematization. Also it is less feasible to invest in specialized equipment. So the cost per burger served is likely to be higher (even if the price is comparable).

The variety dimension

A taxi company offers a high-variety service. It is prepared to pick you up from almost anywhere and drop you off almost anywhere. To offer this variety it must be relatively *flexible*. Drivers must have a good knowledge of the area, and communication between the base and the taxis must be effective. However, the cost per kilometre travelled will be higher for a taxi than for a less customized form of transport such as a bus service. Although both provide the same basic service (transportation), the taxi service has a high variety of routes and times to offer its customers, while the bus service has a few well-defined routes, with a set schedule. If all goes to schedule, little, if any, flexibility is required from the operation. All is **standardized** and regular, which results in relatively low costs compared with using a taxi for the same journey.

Standardized

The variation dimension

Consider the demand pattern for a successful summer holiday resort hotel. Not surprisingly, more customers want to stay in summer vacation times than in the middle of winter. At the height of 'the season' the hotel could be full to its capacity. Off-season demand, however, could be a small fraction of its capacity. Such a marked variation in demand means that the operation must change its capacity in some way, for example, by hiring extra staff for the summer. The hotel must try to predict the likely level of demand. If it gets this wrong, it could result in too much or too little capacity. Also, recruitment costs, overtime costs and under-utilization of its rooms all have the effect of increasing the hotel's costs operation compared with a hotel of a similar standard with level demand. A hotel which has relatively level demand can plan its activities well in advance. Staff can be scheduled, food can be bought and rooms can be cleaned in a *routine* and *predictable* manner. This results in a high utilization of resources and unit costs which are likely to be lower than those in hotels with a highly variable demand pattern.

The visibility dimension

Visibility is a slightly more difficult dimension of operations to envisage. It refers to how much of the operation's activities its customers experience, or how much the operation is **exposed** to its customers. Generally, customer-processing operations are more exposed to their customers than material- or information-processing operations. But even customer-processing operations have some choice as to how visible they wish their operations to be. For example, a retailer could operate as a high-visibility 'bricks and mortar', or a lower-visibility web-based operation. In the 'bricks and mortar', high-visibility operation, customers will directly experience most of its 'value-adding' activities. Customers will have a relatively *short waiting tolerance*, and may walk out if not served in a reasonable time. Customers' perceptions, rather than objective criteria, will also be important. If they perceive that a member of the operation's staff is discourteous to them, they are likely to be dissatisfied (even if the staff member meant no discourtesy), so high-visibility operations require staff with good customer contact skills. Customers could also request goods which clearly would not be sold in such a shop, but because the customers are actually in the operation they can ask what they like! This is called **high received variety**. This makes it difficult for high-visibility operations to achieve high productivity of resources, so they tend to be relatively high-cost operations. Conversely, a web-based retailer, while not a pure low-contact operation, has far lower visibility. Behind its web site it can be more 'factory-like'. The *time lag* between the order being placed and the items ordered by the customer being retrieved and dispatched does not have to be minutes as in the shop, but can be hours or even days. This allows the tasks of finding the items, packing and dispatching them to be *standardized* by staff who need few **customer contact skills**. Also, there can be relatively *high staff utilization*. The web-based organization can also centralize its operation

Visibility means process exposure

High received variety

Customer contact skills

Short case
Two very different hotels

Formule 1

Hotels are high-contact operations – they are staff-intensive and have to cope with a range of customers, each with a variety of needs and expectations. So, how can a highly successful chain of affordable hotels avoid the crippling costs of high customer contact? Formule 1, a subsidiary of the French Accor group, manages to offer outstanding value by adopting two principles not always associated with hotel operations – standardization and an innovative use of technology. Formule 1 hotels are usually located close to the roads, junctions and cities which make them visible and accessible to prospective customers. The hotels themselves are made from state-of-the-art volumetric prefabrications. The prefabricated units are arranged in various configurations to suit the characteristics of each individual site. All rooms are nine square metres in area, and are designed to be attractive, functional, comfortable and soundproof. Most important, they are designed to be easy to clean and maintain. All have the same fittings, including a double bed, an additional bunk-type bed, a wash basin, a storage area, a working table with seat, a wardrobe and a television set. The reception of a Formule 1 hotel is staffed only from 6.30 am to 10.00 am and from 5.00 pm to 10.00 pm. Outside these times an automatic machine sells rooms to credit card users, provides access to the hotel, dispenses a security code for the room and even prints a receipt. Technology is also evident in the washrooms. Showers and toilets are automatically cleaned after each use by using nozzles and heating elements to spray the room with a disinfectant solution and dry it before it is used again. To keep things even simpler, Formule 1 hotels do not include a restaurant as they are usually located near existing restaurants. However, a continental breakfast is available, usually between 6.30 am and 10.00 am, and of course on a 'self-service' basis!

Mwagusi Safari Lodge

The Mwagusi Safari Lodge lies within Tanzania's Ruaha National Park, a huge undeveloped wilderness, whose beautiful open landscape is especially good for seeing elephant, buffalo and lion. Nestled into a bank of the Mwagusi Sand River, this small exclusive tented camp overlooks a watering hole in the riverbed. Its ten tents are within thatched bandas (accommodation), each furnished comfortably in the traditional style of the camp. Each banda has an en-suite bathroom with flush toilet and a hot shower. Game viewing can be experienced even from the seclusion of the veranda. The sight of thousands of buffalo flooding the riverbed below the tents and dining room banda is not uncommon, and elephants, giraffes, and wild dogs are frequent uninvited guests to the site. There are two staff for each customer, allowing individual needs and preferences to be met quickly at all times. Guest numbers vary throughout the year, occupancy being low in the rainy season from January to April, and full in the best game viewing period from September to November. There are game drives and walks throughout the area, each selected for individual customers' individual preferences. Drives are taken in specially adapted open-sided four-wheel-drive vehicles, equipped with reference books, photography equipment, medical kits and all the necessities for a day in the bush. Walking safaris, accompanied by an experienced guide can be customized for every visitor's requirements and abilities. Lunch can be taken communally, so that visitors can discuss their interests with other guides and managers. Dinner is often served under the stars in a secluded corner of the dry riverbed.

on one (physical) site, whereas the 'bricks and mortar' shop needs many shops close to centres of demand. Therefore, the low-visibility web-based operation will have lower costs than the shop.

Mixed high- and low-visibility processes

Some operations have both high- and low-visibility processes within the same operation. In an airport, for example: some activities are totally 'visible' to its customers such as information desks answering people's queries. These staff operate in what is termed a **front-office** environment. Other parts of the airport have little, if any, customer 'visibility', such as the baggage handlers. These rarely-seen staff perform the vital but low-contact tasks, in the **back-office** part of the operation.

Front office

Back office

The implications of the four Vs of operations processes

All four dimensions have implications for the cost of creating the products or services. Put simply, high volume, low variety, low variation and low customer contact all help to keep processing costs down. Conversely, low volume, high variety, high variation and high customer contact generally carry some kind of cost penalty for the operation. This is why the volume dimension is drawn with its 'low' end at the left, unlike the other dimensions, to keep all the 'low cost' implications on the right. To some extent the position of an operation in the **four dimensions** is determined by the demand of the market it is serving. However, most operations have some discretion in moving themselves on the dimensions. Figure 1.7 summarizes the implications of such positioning.

'Four Vs' analysis of processes

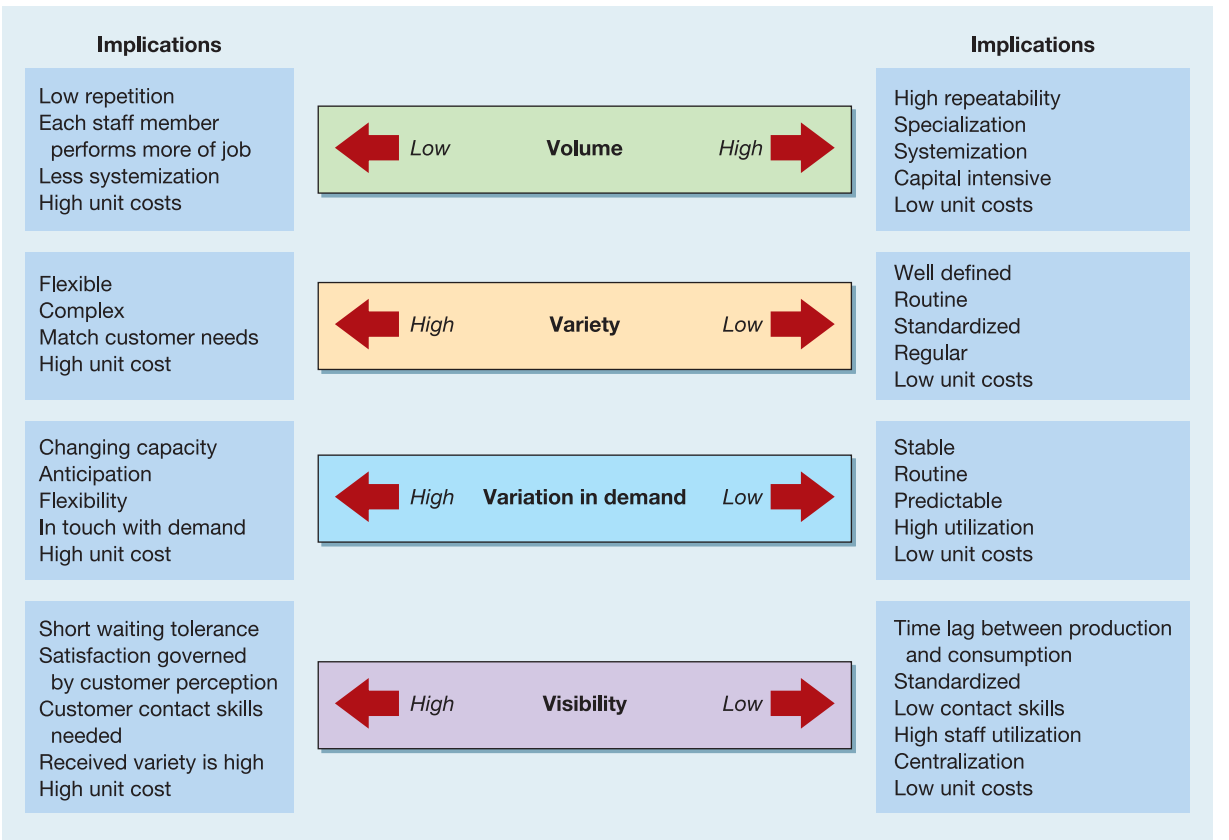

Figure 1.7 A typology of operations

Worked example

Figure 1.8 illustrates the different positions on the dimensions of the Formule 1 hotel chain and the Mwagusi Safari Lodge (*see* the short case on 'Two very different hotels'). Both provide the same basic service as any other hotel. However, one is of a small, intimate nature with relatively few customers. Its variety of services is almost infinite in the sense that customers can make individual requests in terms of food and entertainment. Variation is high and customer contact, and therefore visibility, is also very high (in order to ascertain customers' requirements and provide for them). All of this is very different from Formule 1, where volume is high (although not as high as in a large city-centre hotel), variety of service is strictly limited, and business and holiday customers use the hotel at different times, which limits variation. Most notably, though, customer contact is kept to a minimum. The Mwagusi Safari Lodge hotel has very high levels of service but provides them at a high cost (and therefore a high price). Conversely, Formule 1 has arranged its operation in such a way as to minimize its costs.

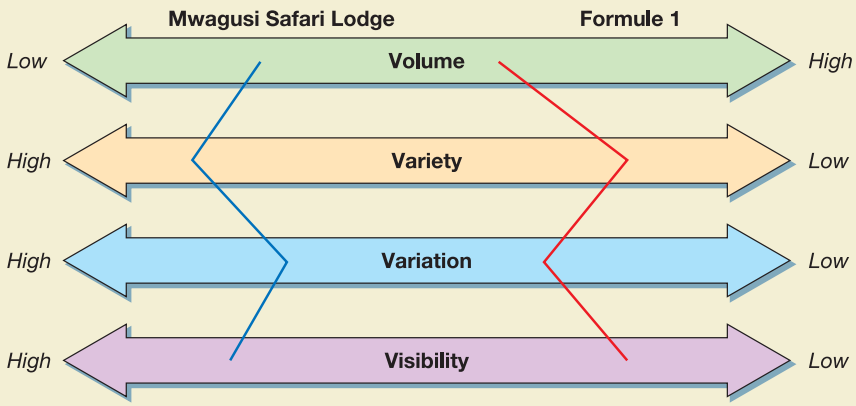

Figure 1.8 Profiles of two operations

The activities of operations management

Operations managers have some responsibility for all the activities in the organization which contribute to the effective production of products and services. And while the exact nature of the operations function's responsibilities will, to some extent, depend on the way the organization has chosen to define the boundaries of the function, there are some general classes of activities that apply to all types of operation.

- **Understanding the operation's strategic performance objectives.** The first responsibility of any operations management team is to understand what it is trying to achieve. This means understanding how to judge the performance of the operation at different levels, from broad and strategic to more operational performance objectives. This is discussed in Chapter 2.
- **Developing an operations strategy for the organization.** Operations management involves hundreds of minute-by-minute decisions, so it is vital that there is a set of general principles which can guide decision-making towards the organization's longer-term goals. This is an operations strategy and is discussed in Chapter 3.

- **Designing the operation's products, services and processes**. Design is the activity of determining the physical form, shape and composition of products, services and processes. It is a crucial part of operations managers' activities and is discussed in Chapters 4 to 9.
- **Planning and controlling the operation**. Planning and control is the activity of deciding what the operations resources should be doing, then making sure that they really are doing it. Chapters 10 to 17 explain various planning and control activities.
- **Improving the performance of the operation**. The continuing responsibility of all operations managers is to improve the performance of their operation. Chapters 18 to 20 describes improvement activities.
- **The social responsibilities of operations management**. It is increasingly recognized by many businesses that operations managers have a set of broad societal responsibilities and concerns beyond their direct activities. The general term for these aspects of business responsibility is 'corporate social responsibility' or CSR. It should be of particular interest to operations managers, because their activities can have a direct and significant effect on society. This is discussed in Chapter 21.

The model of operations management

Operations activities define operations management and operations strategy

We can now combine two ideas to develop the model of operations management which will be used throughout this book. The first is the input–transformation–output model and the second is the categorization of operations management's activity areas. Figure 1.9 shows how these two ideas go together. The model now shows two interconnected loops of **activities**. The bottom one more or less corresponds to what is usually seen as operations management, and the top one to what is seen as operations strategy. This book concentrates on the former but tries to cover enough of the latter to allow the reader to make strategic sense of the operations manager's job.

Critical commentary

The central idea in this introductory chapter is that all organizations have operations processes which produce products and services and all these processes are essentially similar. However, some believe that by even trying to characterize processes in this way (perhaps even by calling them 'processes') one loses or distorts their nature, depersonalizes or takes the 'humanity' out of the way in which we think of the organization. This point is often raised in not-for-profit organizations, especially by 'professional' staff. For example the head of one European 'Medical Association' (a doctors' trade union) criticized hospital authorities for expecting a *'sausage factory service based on productivity targets'*.[5] No matter how similar they appear on paper, it is argued, a hospital can never be viewed in the same was a factory. Even in commercial businesses, professionals, such as creative staff, often express discomfort at their expertise being described as a 'process'.

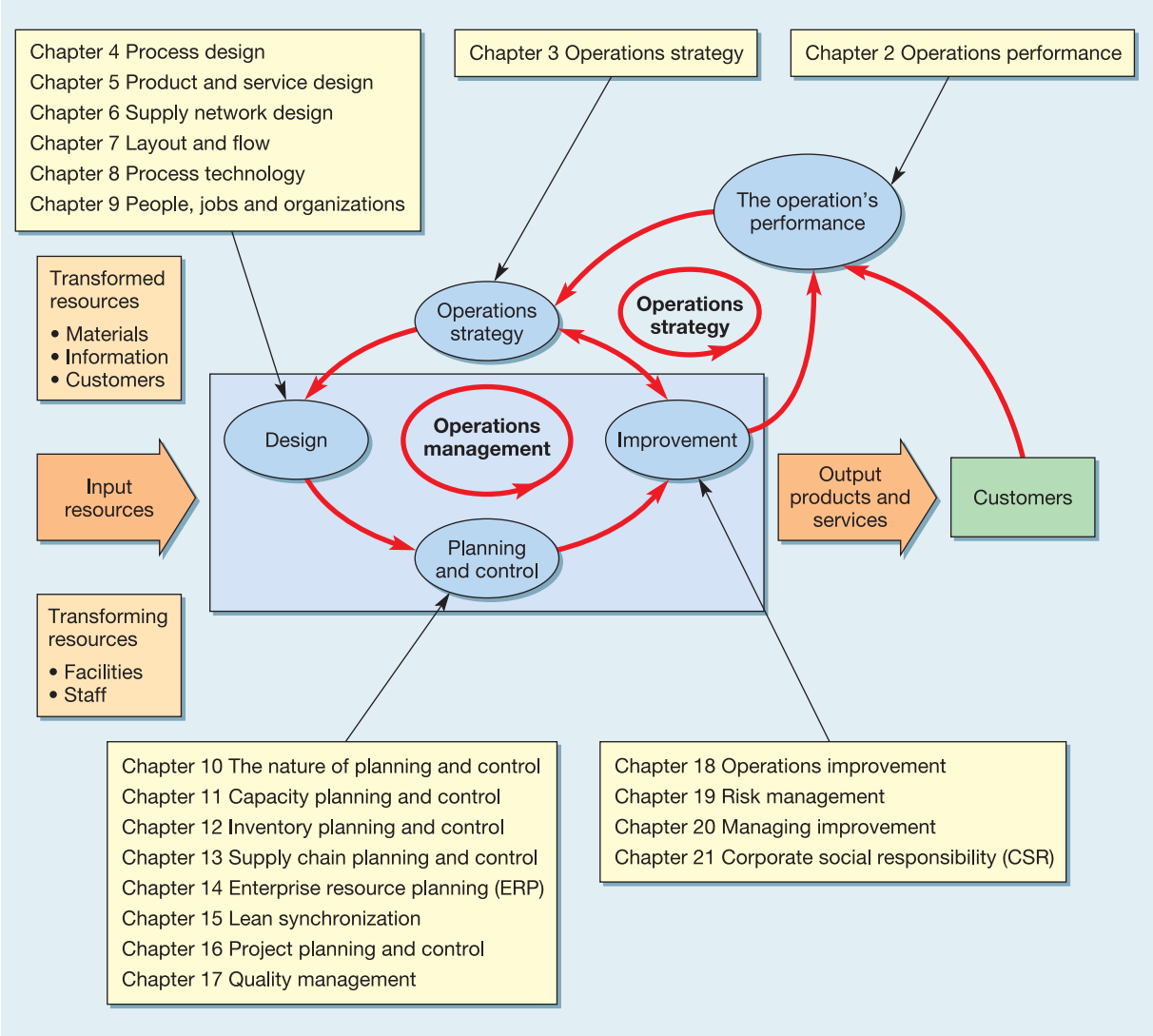

Figure 1.9 A general model of operations management and operations strategy

Summary answers to key questions

Check and improve your understanding of this chapter using self assessment questions and a personalised study plan, audio and video downloads, and an eBook – all at ***www.myomlab.com****.*

➤ What is operations management?

- Operations management is the activity of managing the resources which are devoted to the production and delivery of products and services. It is one of the core functions of any business, although it may not be called operations management in some industries.
- Operations management is concerned with managing processes. And all processes have internal customers and suppliers. But all management functions also have processes. Therefore, operations management has relevance for all managers.

➔

➤ Why is operations management important in all types of organization?

- Operations management uses the organization's resources to create outputs that fulfil defined market requirements. This is the fundamental activity of any type of enterprise.
- Operations management is increasingly important because today's business environment requires new thinking from operations managers.

➤ What is the input–transformation–output process?

- All operations can be modelled as input–transformation–output processes. They all have inputs of transforming resources, which are usually divided into 'facilities' and 'staff', and transformed resources, which are some mixture of materials, information and customers.
- Few operations produce only products or only services. Most produce some mixture of tangible goods or products and less tangible services.

➤ What is the process hierarchy?

- All operations are part of a larger supply network which, through the individual contributions of each operation, satisfies end-customer requirements.
- All operations are made up of processes that form a network of internal customer–supplier relationships within the operation.
- End-to-end business processes that satisfy customer needs often cut across functionally based processes.

➤ How do operations processes have different characteristics?

- Operations differ in terms of the volume of their outputs, the variety of outputs, the variation in demand for their outputs, and the degree of 'visibility' they have.
- High volume, low variety, low variation and low customer 'visibility' are usually associated with low cost.

➤ What are the activities of operations management?

- Responsibilities include understanding relevant performance objectives, setting an operations strategy, the design of the operation (products, services and processes), planning and controlling the operation, and the improvement of the operation over time.
- Operations managers also have a set of broad societal responsibilities. These are generally called 'corporate social responsibility' or CSR objectives.

Case study
Design house partnerships at Concept Design Services[6]

'I can't believe how much we have changed in a relatively short time. From being an inward-looking manufacturer, we became a customer-focused "design and make" operation. Now we are an integrated service provider. Most of our new business comes from the partnerships we have formed with design houses. In effect, we design products jointly with specialist design houses that have a well-known brand, and offer them a complete service of manufacturing and distribution. In many ways we are now a "business-to-business" company rather than a "business-to-consumer" company.' (Jim Thompson, CEO, Concept Design Services (CDS))

CDS had become one of Europe's most profitable homeware businesses. Originally founded in the 1960s, the company had moved from making industrial mouldings, mainly in the aerospace sector, and some cheap 'homeware' items such as buckets and dustpans, sold under the 'Focus' brand name, to making very high-quality (expensive) stylish homewares with a high 'design value'.

Source: Alamy/Adrian Sherratt

The move into 'Concept' products

The move into higher-margin homeware had been masterminded by Linda Fleet, CDS's Marketing Director, who had previously worked for a large retail chain of paint and wallpaper retailers. '*Experience in the decorative products industry had taught me the importance of fashion and product development, even in mundane products such as paint. Premium-priced colours and new textures would become popular for one or two years, supported by appropriate promotion and features in lifestyle magazines. The manufacturers and retailers who created and supported these products were dramatically more profitable than those who simply provided standard ranges. Instinctively, I felt that this must also apply to homeware. We decided to develop a whole coordinated range of such items, and to open up a new distribution network for them to serve upmarket stores, kitchen equipment and speciality retailers. Within a year of launching our first new range of kitchen homeware under the* "Concept" *brand name, we had over 3000 retail outlets signed up, provided with point-of-sale display facilities. Press coverage generated an enormous interest which was reinforced by the product placement on several TV cookery and "lifestyle" programmes. We soon developed an entirely new market and within two years "Concept" products were providing over 75 per cent of our revenue and 90 per cent of our profits. The price realization of Concept products is many times higher than for the* Focus *range. To keep ahead we launched new ranges at regular intervals.'*

The move to the design house partnerships

'Over the last four years, we have been designing, manufacturing and distributing products for some of the more prestigious design houses. This sort of business is likely to grow, especially in Europe where the design houses appreciate our ability to offer a full service. We can design products in conjunction with their own design staff and offer them a level of manufacturing expertise they can't get elsewhere. More significantly, we can offer a distribution service which is tailored to their needs. From the customer's point of view the distribution arrangements appear to belong to the design house itself. In fact they are based exclusively on our own call centre, warehouse and distribution resources.'

The most successful collaboration was with Villessi, the Italian designers. Generally it was CDS's design expertise which was attractive to 'design house' partners. Not only did CDS employ professionally respected designers, they had also acquired a reputation for being able to translate difficult technical designs into manufacturable and saleable →

products. Design house partnerships usually involved relatively long lead times but produced unique products with very high margins, nearly always carrying the design house's brand. *'This type of relationship plays to our strengths. Our design expertise gains us entry to the partnership but we are soon valued equally for our marketing, distribution and manufacturing competence.'* (Linda Fleet, Marketing Director)

Manufacturing operations

All manufacturing was carried out in a facility located 20 km from head office. Its moulding area housed large injection-moulding machines, most with robotic material handling capabilities. Products and components passed to the packing hall, where they were assembled and inspected. The newer more complex products often had to move from moulding to assembly and then back again for further moulding. All products followed the same broad process route but with more products needing several progressive moulding and assembly stages, there was an increase in 'process flow recycling' which was adding complexity. One idea was to devote a separate cell to the newer and more complex products until they had 'bedded in'. This cell could also be used for testing new moulds. However, it would need investment in extra capacity that would not always be fully utilized. After manufacture, products were packed and stored in the adjacent distribution centre.

'When we moved into making the higher-margin Concept products, we disposed of most of our older, small injection-moulding machines. Having all larger machines allowed us to use large multi-cavity moulds. This increased productivity by allowing us to produce several products, or components, each machine cycle. It also allowed us to use high-quality and complex moulds which, although cumbersome and more difficult to change over, gave a very high-quality product. For example, with the same labour we could make three items per minute on the old machines, and 18 items per minute on the modern ones using multi-moulds. That's a 600 per cent increase in productivity. We also achieved high-dimensional accuracy, excellent surface finish, and extreme consistency of colour. We could do this because of our expertise derived from years making aerospace products. Also, by standardizing on single large machines, any mould could fit any machine. This was an ideal situation from a planning perspective, as we were often asked to make small runs of Concept *products at short notice.'* (Grant Williams, CDS Operations Manager)

Increasing volume and a desire to reduce cost had resulted in CDS subcontracting much of its Focus products to other (usually smaller) moulding companies. *'We would never do it with any complex or design house partner products, but it should allow us to reduce the cost of making basic products while releasing capacity for higher-margin ones. However, there have been quite a few 'teething problems'. Coordinating the production schedules is currently a problem, as is agreeing quality standards. To some extent it's our own fault. We didn't realize that subcontracting was a skill in its own right. And although we have got over some of the problems, we still do not have a satisfactory relationship with all of our sub-contractors.'* (Grant Williams, CDS Operations Manager)

Planning and distribution services

The distribution services department of the company was regarded as being at the heart of the company's customer service drive. Its purpose was to integrate the efforts of design, manufacturing and sales by planning the flow of products from production, through the distribution centre, to the customer. Sandra White, the Planning Manager, reported to Linda Fleet and was responsible for the scheduling of all manufacturing and distribution, and for maintaining inventory levels for all the warehoused items. '*We try to stick to a preferred production sequence for each machine and mould so as to minimize set-up times by starting on a light colour, and progressing through a sequence to the darkest. We can change colours in 15 minutes, but because our moulds are large and technically complex, mould changes can take up to three hours. Good scheduling is important to maintain high plant utilization. With a higher variety of complex products, batch sizes have reduced and it has brought down average utilization. Often we can't stick to schedules. Short-term changes are inevitable in a fashion market. Certainly better forecasts would help . . . but even our own promotions are sometimes organized at such short notice that we often get caught with stockouts. New products in particular are difficult to forecast, especially when they are "fashion" items and/or seasonal. Also, I have to schedule production time for new product mould trials; we normally allow 24 hours for the testing of each new mould received, and this has to be done on production machines. Even if we have urgent orders, the needs of the designers always have priority.'* (Sandra White)

Customer orders for Concept and design house partnership products were taken by the company's sales call centre located next to the warehouse. The individual orders would then be dispatched using the company's own fleet of medium and small distribution vehicles for UK orders, but using carriers for the Continental European market. A standard delivery timetable was used and an 'express delivery' service was offered for those customers prepared to pay a small delivery premium. However, a recent study had shown that almost 40 per cent of express deliveries were initiated by the company rather than customers. Typically this would be to fulfil deliveries of orders containing products out of stock at the time of ordering. The express delivery service was not required for *Focus* products because almost all deliveries were to five large customers. The size of each order was usually very large, with deliveries to customers' own distribution depots. However, although the organization of Focus delivery was relatively straightforward, the consequences of failure were large. Missing a delivery meant upsetting a large customer.

Challenges for CDS

Although the company was financially successful and very well regarded in the homeware industry, there were a number of issues and challenges that it knew it would have to address. The first was the role of the design department and its influence over new product development.

New product development had become particularly important to CDS, especially since they had formed alliances with design houses. This had led to substantial growth in both the size and the influence of the design department, which reported to Linda Fleet. *'Building up and retaining design expertise will be the key to our future. Most of our growth is going to come from the business which will be bought in through the creativity and flair of our designers. Those who can combine creativity with an understanding of our partners' business and design needs can now bring in substantial contracts. The existing business is important of course, but growth will come directly from these people's capabilities.'* (Linda Fleet)

But not everyone was so sanguine about the rise of the design department. *'It is undeniable that relationships between the designers and other parts of the company have been under strain recently. I suppose it is, to some extent, inevitable. After all, they really do need the freedom to design as they wish. I can understand it when they get frustrated at some of the constraints which we have to work under in the manufacturing or distribution parts of the business. They also should be able to expect a professional level of service from us. Yet the truth is that they make most of the problems themselves. They sometimes don't seem to understand the consequences or implications of their design decisions or the promises they make to the design houses. More seriously they don't really understand that we could actually help them do their job better if they cooperated a bit more. In fact, I now see some of our design house partners' designers more than I do our own designers. The Villessi designers are always in my factory and we have developed some really good relationships.'* (Grant Williams)

The second major issue concerned sales forecasting, and again there were two different views. Grant Williams was convinced that forecasts should be improved. *'Every Friday morning we devise a schedule of production and distribution for the following week. Yet, usually before Tuesday morning, it has had to be significantly changed because of unexpected orders coming in from our customers' weekend sales. This causes tremendous disruption to both manufacturing and distribution operations. If sales could be forecast more accurately we would achieve far high utilization, better customer service, and I believe, significant cost savings.'*

However, Linda Fleet saw things differently. *'Look, I do understand Grant's frustration, but after all, this is a fashion business. By definition it is impossible to forecast accurately. In terms of month-by-month sales volumes we are in fact pretty accurate, but trying to make a forecast for every week end every product is almost impossible to do accurately. Sorry, that's just the nature of the business we're in. In fact, although Grant complains about our lack of forecast accuracy, he always does a great job in responding to unexpected customer demand.'*

Jim Thompson, the Managing Director, summed up his view of the current situation. *'Particularly significant has been our alliances with the Italian and German design houses. In effect we are positioning ourselves as a complete service partner to the designers. We have a world-class design capability together with manufacturing, order processing, order-taking and distribution services. These abilities allow us to develop genuinely equal partnerships which integrate us into the whole industry's activities.'*

Linda Fleet also saw an increasing role for collaborative arrangements. *'It may be that we are seeing a fundamental change in how we do business within our industry. We have always seen ourselves as primarily a company that satisfies consumer desires through the medium of providing good service to retailers. The new partnership arrangements put us more into the "business-to-business" sector. I don't have any problem with this in principle, but I'm a little anxious as to how much it gets us into areas of business beyond our core expertise.'*

The final issue which was being debated within the company was longer-term, and particularly important. *'The two big changes we have made in this company have both happened because we exploited a strength we already had within the company. Moving into Concept products was only possible because we brought our high-tech precision expertise that we had developed in the aerospace sector into the homeware sector where none of our new competitors could match our manufacturing excellence. Then, when we moved into design house partnerships we did so because we had a set of designers who could command respect from the world-class design houses with whom we formed partnerships. So what is the next move for us? Do we expand globally? We are strong in Europe but nowhere else in the world. Do we extend our design scope into other markets, such as furniture? If so, that would take us into areas where we have no manufacturing expertise. We are great at plastic injection moulding, but if we tried any other manufacturing processes, we would be no better than, and probably worse than, other firms with more experience. So what's the future for us?'* (Jim Thompson, CEO CDS).

Questions

1. Why is operations management important in CDS?
2. Draw a 4 Vs profile for the company's products and services.
3. What would you recommend to the company if they asked you to advise them in improving their operations?

Problems and applications

These problems and applications will help to improve your analysis of operations. You can find more practice problems as well as worked examples and guided solutions on MyOMLab at ***www.myomlab.com****.*

1 Read the short case on Pret A Manger and **(a)** identify the processes in a typical Pret A Manger shop together with their inputs and outputs, **(b)** Pret A Manger also supplies business lunches (of sandwiches and other take-away food). What are the implications for how it manages its processes within the shop? **(c)** What would be the advantages and disadvantages if Pret A Manger introduced 'central kitchens' that made the sandwiches for a number of shops in an area? (As far as we know, they have no plans to do so.)

2 Compare and contrast Acme Whistles and Pret A Manger in terms of the way that they will need to manage their operations.

3 Visit a furniture store (other than IKEA) and a sandwich or snack shop (other than Pret A Manger). Observe how each shop operates, for example, where customers go, how staff interact with them, how big it is, how the shop has chosen to use its space, what variety of products it offers, and so on. Talk with the staff and managers if you can. Think about how the shops you have visited are similar to IKEA and Pret A Manger, and how they differ. Then consider the question, *'What implications do the differences between the shops you visited and the two described in Chapter 1 have for their operations management?'*

4 Visit and observe three restaurants, cafés or somewhere that food is served. Compare them in terms of the Volume of demand that they have to cope with, the Variety of menu items they service, the Variation in demand during the day, week and year, and the Visibility you have of the preparation of the food. Think about and discuss the impact of volume, variety, variation and visibility on the day-to-day management of each of the operations and consider how each operation attempts to cope with its volume, variety, variation and visibility.

5 (Advanced) Find a copy of a financial newspaper (*Financial Times*, *Wall Street Journal*, *Economist*, etc.) and identify one company which is described in the paper that day. Using the list of issues identified in Table 1.1, what do you think would be the *new operations agenda* for that company?

Selected further reading

Chase, R.B., Jacobs, F.R. and Aquilano, N.J. (2004) *Operations Management for Competitive Advantage* (10th edn), McGraw-Hill/Irwin, Boston. There are many good general textbooks on operations management. This was one of the first and is still one of the best, though written very much for an American audience.

Chopra, S., Deshmukh, S., Van Mieghem, J., Zemel, E. and Anupindi, R. (2005) *Managing Business Process Flows: Principles of Operations Management*, Prentice-Hall, NJ. Takes a 'process' view of operations. Mathematical but rewarding.

Hammer, M. and Stanton, S. (1999) How process enterprises really work, *Harvard Business Review*, Nov–Dec. Hammer is one of the gurus of process design. This paper is typical of his approach.

Heizer, J. and Render, B. (2006) *Operations Management* (8th edn), Prentice Hall, New Jersey. Another good US authored general text on the subject.

Johnston, R. and Clark, G. (2008) *Service Operations Management* (3rd edn), Financial Times-Prentice Hall, Harlow. What can we say! A great treatment of service operations from the same stable as this textbook.

Slack, N. and Lewis, M.A. (eds) (2005) *The Blackwell Encyclopedic Dictionary of Operations Management* (2nd edn), Blackwell Business, Oxford. For those who like technical descriptions and definitions.

Useful web sites

www.opsman.org Useful materials and resources.
www.iomnet.org The Institute of Operations Management site. One of the main professional bodies for the subject.
www.poms.org A US academic society for production and operations management. Academic, but some useful material, including a link to an encyclopaedia of operations management terms.
www.sussex.ac.uk/users/dt31/TOMI/ One of the longest-established portals for the subject. Useful for academics and students alike.
www.ft.com Useful for researching topics and companies.
www.journaloperationsmanagement.org The home site for the best known operations management journal. A bit academic, but some pages are useful.