

ESSENTIAL OPERATIONS MANAGEMENT

Second Edition

Chapter Summaries

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Chapter 1: Managing operations

- The operations process transforms inputs into outputs that the organization then sells in its chosen markets. Figure 1.4 overviews this core task, while Figure 1.5 provides examples from both the service and manufacturing sectors.
- As operations typically accounts for 60–70 per cent of the people, assets and costs within an organization, its sheer size makes it a demanding management task. In addition to undertaking these activities, operations comprises a wide range of functions and support roles, examples of which are given in Figure 1.2.
- Most companies deliver a mix of both service and product, as illustrated in Figure 1.8. Where an organization chooses to position itself on this service–product mix continuum will influence its competitive position and the operations task involved.
- While most offerings are a combination of services and products, there are important distinctions in managing operations in the service and manufacturing sectors. These are outlined and overviewed in Figure 1.9.
- Most of the people within a typical organization work within the operations function and reflect a wide range of jobs, skills and personal needs. A critical part of the operations role is to manage the operations process through people in such a way as to meet the short- and long-term needs of the business, as well as the development needs and personal expectations of those involved.
- Operations has a significant strategic contribution to make in retaining and growing market share. It is responsible for meeting the requirements of the sale and this, in turn, affects whether customers purchase a second time (see Figure 1.3).

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Chapter 2: Operations Strategy

- As companies grow, clusters of similar activities are separated out and managed as functions. Typical functions include accounting and finance, sales and marketing, human resources, IT, operations, and research and development. The principal reason for this is to make it easier to manage the corporate complexity that follows growth. It also allows for the development of specialist skills.
- Functions have a dual role: they must undertake the day-to-day management of the areas for which they are responsible while also developing strategies to support agreed markets. The latter role has been the subject of this chapter, and the former is addressed in the rest of the book.

- To cope with further growth and increasing complexity, organizations are split into different business units in which relevant functions are provided and developed. The outcome is strategy at three levels – corporate, business unit and functional.
- Operations, like other functions, contributes to the strategy debate about which markets to compete in, which customers to retain and with which to grow, and the order-winners and qualifiers that relate to these choices.
- Once markets have been agreed and the way to compete has been identified, the current level of support for relevant qualifiers and order-winners is assessed. Any gaps form the basis of a function's strategy, which specifies targets, investments and timescales.
- Operations needs to be proactive in encouraging discussion of the market, as changing operations is typically expensive and involves long lead-times.
- Throughout the chapter, examples of how organizations have successfully developed operations strategies in support of chosen markets have been provided. These examples illustrate how an operations strategy works, while the end of chapter questions cover issues raised throughout this section.

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Chapter 3: Designing Services and Products

- The introduction of new services/products and the development of existing ones is the lifeblood of organizations. For this to become an integral part of how companies grow and prosper, they need a way to generate ideas and then translate them into reality.
- The advent of increasingly sophisticated digital technologies has allowed for a high degree of innovation in product and service offerings in recent years. These technologies have at times been able to disrupt long-established business models – for example Uber's revolution of the traditional Hackney cab and minicab taxi businesses. Not-for-profit innovators such as Fairphone have capitalized on the rapid rate of obsolescence in new technologies by developing ethical ways to extend the life of mobiles as well as recycling them.
- Although breakthroughs will always gain the spotlight, most companies will typically sell today what they sold yesterday, and will do the same tomorrow. This does not imply, however, that they do not need to 'think outside the box'. On the contrary, nothing could be further from the truth. The key is more to do with where to focus attention, and for many companies this means thinking differently about what they currently provide and the markets in which they currently compete.
- With ideas being the spark that ignites developments, companies are realizing that they also need to seek views from less traditional sources. Key among these are the staff who provide the service or make the product, and the

customers who buy it. Breaking the mould of past approaches is difficult, but in today's competitive world it is essential.

- While the first step of the process is vital, getting an idea to a market reality is critical. For much of the time, this part of the process changes from being one of inspiration to one based on hard work. Systematic checking and rechecking involves much time and effort.
- Finally, although new services/products create tomorrow's success, a company needs to get the most out of today's offerings. On the scale of being inherently interesting, generating ideas is at the top, with developing existing services/products much lower down. However, on the scale of what affects corporate success and prosperity, the order is often the reverse. The attraction of stars and the mundane nature of cash cows often results in an imbalance of time, attention and recognition. Keeping all the corporate balls in the air is an essential element of successfully managing the process for the design and development of services and products.

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Chapter 4: Delivering Services

- A key decision for any company is how to deliver its services in order to meet both the needs of its customers and the objectives of the business.
- Factors that must be taken into account are divided into the technical requirement (what the service specification comprises) and the business requirement (the order-winners and qualifiers for the chosen market). Together, these requirements form the service offering, which is experienced by the customer.
- Decisions about service delivery system design are influenced by the distinctive characteristics of the service and the features of the overall and detailed service delivery system design.
- The impact of IT and other developments on design alternatives has been described in the chapter, and examples have been provided to illustrate the continued impact on service delivery.
- Finally, the other issues to be considered in delivering services were explained, with examples.

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Chapter 5: Making Products

- A key role in operations is to determine how best to make the products an organization sells to its customers. In the context of the business, 'how best' means selecting manufacturing processes that can meet both the technical dimensions and the market needs (the order-winners and qualifiers) of its customers.
- Meeting the technical characteristics leads to certain, often predetermined, choices –commercial bread-making requires ovens of a given size, plastic mouldings need injection moulding machines and so on. While this is a key issue, alternative process technologies normally form part of the role of engineering and other technical functions. Operations must use these technologies to make products in line with the needs of a company's chosen markets.
- Operations has to choose the type(s) of manufacturing process to best meet customers' demands. This chapter has described the process choices and their associated trade-offs.

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Chapter 6: Location and Layout

- The two tasks of deciding location and layout are distinct yet related. They are distinct in that location concerns where best to site a facility, whereas layout concerns how best to arrange the staff, processes and equipment within that facility. And they are related in that they form two parts of a key decision – how best to position facilities in order to perform the operations task and meet the needs of the business.
- Decisions about where to locate may need to be taken at several levels, from deciding on a continent or region down to the choice of the site itself.
- Within these choices, the factors to be taken in account can be categorized into those of a general nature (broad-based issues that could influence or even override other factors, such as the origin of existing sites and politically based constraints) and those which have economic implications (such as market access).
- A number of specific factors, such as infrastructure and proximity to markets and suppliers, also affect the location decision at each level.
- Weighted factor and centre of gravity methods are two analytical techniques that help companies when making these key decisions.
- Layout decisions are affected by background factors such as the availability of space and meeting the potential need for future flexibility.

- **The basic types of layout are fixed position, process or functional, and service or product. The choice of which to use will depend on the type of service delivery system and manufacturing process involved.**
- **Cells are a hybrid delivery system, developed from a mix of functional and service/ product layouts.**
- **Having decided on the appropriate basic layout, the next step is to design a detailed layout. Frequency charts and relationship charts are used to analyse and design process or functional layouts, while line balancing and waiting line analysis are important aspects of service and product layout design.**

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Chapter 7: Managing Capacity

- **Managing capacity is central to the basic business task of providing services and products in line with customer demand. As the elements of staff, delivery systems and processes contribute to operations' capacity, its central role is further emphasized by the size and interrelated nature of its provision. Key elements of effectively managing capacity include:**
 - Determining the way in which capacity is most appropriately measured to reflect the nature of the business involved
 - Measuring output needs to distinguish between the dimensions of utilization (a comparison of actual hours worked with planned hours) and efficiency (a comparison of the work produced to the number of hours worked)
 - The desired position is to have neither too much nor too little capacity. But corporate decisions concerning make versus buy, service/product range, process design and the perishable nature of capacity (particularly in the service sector) are among the several variables that make this a difficult call.
- **Within an environment where definitions of capacity are characterized by uncertainty, operations needs to reduce the planning and managing task in several ways, including:**
 - Identifying those parts of total demand that can be predicted (for example, seasonality and peaks) as opposed to those which cannot be predicted, and thereby reducing the truly uncertain aspects when forecasting demand.
 - Influencing demand to reduce the peaks and troughs that characterize demand profiles.
- **The remainder of the chapter addressed the long-term horizons of capacity provision and the ways to help when managing demand and capacity. Key points included the approaches to resource planning (often two to five years ahead) and medium-term planning (typically from six months to two years ahead) – Figure 7.9 provides an overview of these operations planning and control systems.**
- **The sections on resource and medium-term planning also provided**

illustrations of alternative approaches that may be used. In resource planning, the amount, timing and location of capacity were central to the discussion. In medium-term planning, the steps used to provide a plan were detailed, together with alternative approaches to achieving the plan – level capacity, chase demand or a mixed plan.

- The final section in the chapter introduced alternative ways of managing demand (including changing demand patterns and scheduling) and managing capacity (for example, short-term adjustments, forms of flexible capacity and changing its basic form).

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Chapter 8: Scheduling and Executing Operations

- In many markets, meeting customers' on-time delivery needs is a prerequisite for getting and staying on a customer's shortlist, and providing this qualifier is a key operations management task.
- Businesses use a number of ways to cushion the delivery system from the instability of their markets. These ways are classed as basic, secondary and supplementary mechanisms.
- Although the need is the same in all organizations, the way of scheduling operations to meet this requirement differs from business to business and needs to reflect those dimensions which alter the control task and the control design system. These include the complexity of the service or the product, and whether the services and products are specials or standards.
- The main section of the chapter introduced the alternative scheduling systems that are available, explained these in detail and illustrated their use with examples. These were:
 - Bar charts – recording capacity (for example, processes or staff) against a timescale. Figures 8.2 and 8.3 illustrated some of the applications.
 - Network analysis – organizations often use this method to plan, schedule and control complex, one-off tasks. The simple example in Figure 8.6 is then followed by a slightly more complex, real-life example in Figure 8.8.
 - MRPI and JIT – two of the most widely used systems to schedule standard products and services. Referred to as a push and a pull system, respectively, these two systems, and how they differ, are explained in detail.
- All operations control systems start with a statement of demand, produced from data on known and/or forecast sales. One other key reminder at this time is the principle of independent and dependent demand. Whereas assessing demand levels by known and/or forecast orders is a fundamental task for independent demand items, requirements for dependent items can be calculated as they are directly related to the pattern of demand of the independent items to which they relate.
- Once the master schedule for a service or product has been established, the scheduling task of determining material requirements and process/staff

capacities can be completed. These, in turn, provide the inputs for the day-to-day execution of the plan. Detailing the MRPI and JIT systems then completed this section of the text.

- **Next came sections on MRPII and ERP. Where scheduling activities in MRPI are tied in with the tasks of other relevant functions, the result is known as MRPII. ERP evolved out of MRPII and is designed to embrace the whole organization using a common database, thus allowing integration between the different parts without the use of duplicate information systems. The section on ERP outlined the benefits and concerns relating to it while highlighting the key dimensions to ensure its successful application.**
- **Finally, OPT and its finite scheduling role in refining existing control systems were explained. The final section addresses the developments in ERP systems, outlining the benefits and concerns and highlighting the key dimensions to ensure their successful application.**

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Chapter 9: Managing Inventory

- **Inventory is not only sizeable in asset terms, but is also complex to manage and control.**
- **Companies wish to keep the investment in inventory as low as possible. Nevertheless, inventory is an integral part of a company's activities and central to the workings of its processes and delivery systems, so it must be efficiently managed and controlled within the context of the overall business and market requirements.**
- **One overriding principle is that of distinguishing between independent and dependent demand items. As usage rates of the latter are linked to the levels of demand of the former, requirements for dependent demand items can be calculated and scheduled in line with demand for the independent items to which they relate.**
- **The principle of calculating requirements for dependent demand items is central to managing and controlling this type of inventory. However, it may make more sense for a company to hold inventory of some of these dependent demand items at a level that is not tied to a calculated rate of requirement. Reasons for severing this link are to do with issues of overall cost. For items that have a low unit cost (for example, C items), buying in quantities that exceed demand patterns may lower the total unit cost (price per unit plus related inventory costs). Buying or making in large quantities will almost always lower the actual cost per unit, and such items lend themselves to the use of systems such as two-bin type controls that are simple to operate and inexpensive to manage.**
- **The approaches to managing and controlling independent items need to reflect the several issues and dimensions that were introduced and discussed throughout the chapter. Foremost will be the choice of whether to provide services or make products on an MTO, ATO or MTS basis.**
- **In MTO businesses, material and work-in-progress inventory will reflect the delivery dates of customer orders for the services and products provided.**

When they are finished, items will go straight to customers.

- Where items are part-made and then assembled or finished in line with customer orders and where items are MTS, what and how much is made and when and how much to order need to take into account issues such as the 80/20 rule, corporate inventory commitments, the reorder point, buffer inventory requirements and EOQs.
- The key throughout is fitting the decisions to the characteristics and requirements of an organization. Knowing the alternatives that can be used and incorporating relevant dimensions into the decision-making process should always form the basis of the management and control outcomes.

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Chapter 10: Managing Quality

- Quality conformance is either an order-winner or a qualifier in most markets. However, the word 'quality' needs to be defined before it can be measured. For operations, quality conformance means consistently delivering services and products in line with their design specifications, which, in turn, reflects customer needs.
- To manage quality, firms must first control it by determining which quality characteristics need to be delivered, deciding how to measure each of these quality characteristics, setting the required level of quality for each characteristic, and monitoring quality levels to ensure that these standards are met.
- Once the level of quality conformance is consistent and under control, it can then be maintained by correcting quality if it falls below the required standard, and continually improving the management of quality levels.
- A number of tools and techniques have been developed to help organizations improve their level of quality conformance for designing or delivering services and products. Some of the main tools used to improve quality are checklists (for collecting information recording the size and other dimensions of quality [and other] problems), Pareto analysis (for identifying the frequency of causes of quality conformance problems), cause and effect diagrams (for identifying the root cause of a problem, identifying the relationships between causes and determining which ones to address first) and gap analysis (for understanding why there is a gap between customers' expectations and perceptions by identifying whether there is a gap in knowledge, design, performance or communication).
- TQM is an approach and set of guiding principles for managing quality within an organization by focusing on seven key elements:
 - 1 Meeting customers' needs and expectations
 - 2 Covering all parts of the organization
 - 3 Involving everyone in the organization
 - 4 Examining all quality costs
 - 5 Getting things right first time
 - 6 Developing quality systems and procedures
 - 7 Continuously making improvements.

- **TQM can be implemented by:**
 - Developing a quality strategy and getting top-management support
 - Using a steering group
 - Using improvement teams
 - Recognizing success
 - Using quality tools and approaches
 - Training staff in the aims and tools of TQM.

- **The successful implementation of TQM often requires a culture change. It is necessary for employees to be responsible for their own quality and for the task of making improvements to become part of everyone's job. Employees must focus on meeting customers' needs, and suppliers and customers should be involved in the improvement process. A working culture needs to be developed where mistakes are seen as opportunities for improvement rather than reasons for criticism.**

- **Although most companies have developed their own approaches to managing quality, a number of formal national and international frameworks are also available to help organizations consistently design and deliver services and products in line with their specifications. The three most widely used programmes are ISO 9000, the Baldrige Award and the EFQM Excellence Award.**

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Chapter 11: Managing the Supply Chain

- **When designing their supply chains, companies need first to decide what to make and what to buy based on:**
 - The market order-winners and qualifiers they have to support
 - How they could create barriers to entry
 - Whether they need to maintain a supply of key materials
 - How best to understand customer requirements
 - Which core capabilities need to be retained in-house
 - Which external capabilities need to be accessed from elsewhere
 - How the company wishes to take advantage of the trend to reduce barriers on import duties imposed by countries.

- **In reality, however, these decisions are governed by other factors such as continuing previous decisions, meeting cost targets, shedding difficult tasks and fulfilling political requirements. Choosing whether to make or buy brings with it a number of advantages and disadvantages, but some of these can be altered by choosing from other alternatives to outsourcing such as joint ventures and co-sourcing.**

- **Making in-house offers firms greater control over their processes, capabilities and business environment. It also increases market knowledge, product knowledge and technological innovation, while providing a greater opportunity to reduce product cost. However, it can also dilute a company's focus on its core tasks and reduce its access to external sources of capacity, up-to-date technologies and world-class capabilities. On the other hand, it can increase operating costs and make them more difficult to control.**

- To some extent, the advantages and disadvantages of outsourcing are the inverse of those of making in-house. If used appropriately and managed well, outsourcing can free up resources and increase the focus on the core tasks that add value for the customer. Outsourcing can reduce operating costs and make them easier to control, while improving the design and market perception of services and products by giving a company an increased access to external sources of capacity, up-to-date technologies and world-class capabilities. However, it can also result in a loss of control of key processes and capabilities, and can make a business more vulnerable by potentially exposing its intellectual property to outside organizations. Equally, once a process has been outsourced, it is then difficult to move it back in-house as the knowledge is no longer to be found within the organization and the investment involved can be prohibitive.
- Increasingly, companies compete as supply chains rather than individual organizations. Totally integrating a supply chain from material producer through to end customer greatly improves how a business operates and supports its customers. However, effective collaboration and fuller relationships across the supply chain are required to achieve this.
- To develop supply chains, companies must focus on improving consumer support, changing their attitude to suppliers, investing in IT and creating strategic partnerships with companies upstream towards suppliers and downstream towards customers within the chain. The first step is to integrate activities within the internal supply chain by aligning all the activities from initial customer contact to final service or product delivery. Once the internal supply chain has been integrated, companies can start coordinating activities between the different businesses within the chain.
- Finally, the supply chain can be synchronized using partnerships and strategic alliances to help create real-time information flows across the chain in aspects such as customer management, order placement, service or product design, payment and final delivery. This requires dramatic changes in the roles and responsibilities across the chain, with suppliers, distributors and customers often being involved in key decisions from service or product design through to delivery schedules. To achieve this, companies must overcome barriers to integration and focus on moving information rather than inventory across the chain.
- Integrated and synchronized supply chains allow companies to respond better to market opportunities and competitive pressures by competing as a supply chain rather than as a number of individual organizations, and by collaborating with other parts of the chain to improve its efficiency and effectiveness. Such supply chains also allow information to be exchanged, ensuring that end-user needs are met.
- Operating as a demand chain rather than a supply chain allows organizations to reduce inventory levels across the chain while making them more responsive to changing customer requirements.

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Chapter 12: Improving Operations

- Operations needs to be improved to meet a variety of different corporate objectives, the most common reasons being to release cash, improve market support (leading to increased sales) and/or reduce costs.
- Improving operations involves going through four key steps – plan (develop an improvement plan), do (implement the improvement plan), check (measure the impact of the actions made in Step 2 to see whether they have met the objectives set in Step 1) and review (review the checks made and identify further problems or aspects to improve, which leads back to Step 1).
- Companies need to decide whether they want to take a passive or a proactive approach to development, and also whether they want to attain incremental or breakthrough levels of improvement.
- A wide variety of tools and techniques is available to organizations wishing to improve their operations. The key ones include benchmarking, mapping the customer journey, mapping processes, identifying causes of problems, generating improvement ideas and re-engineering business processes.
- After deciding which improvement tools and techniques to use, businesses need to identify their 'high-interest' stakeholders and start using them to help identify and make improvements. Organizations can take either a closed approach to making improvements by only using their own employees and closely guarding their secrets, or a more open approach, involving customers and suppliers when developing new services and ways of working.
- Involving employees is essential if companies want to develop an improvement culture, which is necessary to drive and sustain change. To make this happen, they need to establish self-managed teams, share information and create time to work on improvement activities.
- Involving suppliers requires changing the relationship with suppliers and moving to a situation where customers and suppliers are mutually dependent on each other for developing new services or products and improving how they are delivered.
- Just as businesses can get customers to serve themselves, so they can also use them to improve their services, products and processes. This can increase customer loyalty, reduce research and development costs, and help tailor services and products to customers' needs.

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