# ESM0554 operations management and strategy

**Definition**
Operations management involves the planning and coordination of work. It is especially concerned with the creation and delivery of products and services and with providing the best match of supply with demand. Operations strategy involves the long-term planning and structuring of work by configuring appropriate resources and processes into an operating system that best implements the organization's strategy.

**Abstract**
Strategy and operations are inextricably connected: strategy is a plan to reach an objective and operations is the means of getting there. Operations management involves the planning and coordination of work. Strategically, this involves the long-term planning and structuring of work. Indeed, the task of operations strategy is to design the *operating system,* which is the joint configuration of resources and processes, such that its resulting competencies are aligned with the organization's desired competitive position. Tactically, the task of operations management is to utilize the operating system and provide the best match of supply with demand.

## Operations management and strategy

The word operations stems from the Latin verb *operari* and noun *opus*, which mean (to) work.

Operations simply are activities, but it is typically understood that these activities are planned and coordinated, given that they often require a number of capital and human resources. Managing operations involves structuring and coordinating work. While this includes and is applicable to most human activity, operations management is especially concerned with the creation and delivery of products and services.

When studying operations, it is helpful to adopt three different yet complementary views of operations. The resource view focuses on the assets used in the operation while the process view highlights the operation's activities used in transforming inputs to outputs. The financial analogy is that the resource view focuses on the balance sheet while the process view shows how assets are used in the generation of income. The third view characterizes the competencies of the operation, that is, what it can and cannot do well. We will explain these views in greater detail soon but this suffices to define our topic of interest.

Strategically, operations management involves the long-term planning and structuring of work. Indeed, the task of operations strategy is to design the *operating system*, which is the joint configuration of resources and processes, such that its resulting competencies are aligned with the organization's desired competitive position. In other words, operations strategy focuses on how to best enable and implement the organization's strategy. (For for-profit organizations, 'best' can be measured as maximizing the net present value of profits. For not-for-profits, it could mean minimizing cost subject to strategically specified constraints on quality, time, flexibility and other non-financial metrics.) Tactically, operations management involves the near-term planning and coordination of work. Its task is to utilize the operating system and provide the best match of supply with demand. According to Cachon and Terwiesch (2006), organizations that take the design of their operations seriously and better match supply with demand will gain a significant competitive advantage over their rivals.

In the remainder I will describe the typical operational decisions involved in designing an operations system and a framework to guide operational decision-making.

## The resource view of operations and resource decisions

To coordinate and perform their activities, organizations need a wide variety of resources, which are the means or the real assets needed to perform the activities. The *resource view* considers any organization (or any of its parts) as a bundle of real assets.

Resources or real assets are divided into two groups: tangible and intangible. Tangible real assets are human resources (people) and capital assets (property, plant and equipment as shown on the balance sheet). Intangible assets include relationships with suppliers or customers, intellectual property, reputation and brands, and knowledge and experience in processing, technologies and markets. Often, tangible real assets *do* the work, while intangible assets embody the *know-how* to do the work.

Viewing operations as a bundle of real assets is most useful when deciding on the amounts and types of resources needed by the operation. This investment or capital budgeting decision, along with the

allocation of resources to activities, is undoubtedly a major task of management.

To configure its resource portfolio, the organization must make (at least) four key decisions:

1. Capacity sizing is deciding on how many resources to invest in for each resource type. The resource type with the lowest resource capacity is the bottleneck and determines the capacity of the entire operations system. Strategically, capacity sizing involves investment in processing resources: capital and labour. Tactically, one adds buffers and must size their desired inventory to accommodate scale economies (e.g., for batch processing or quantity discounts) and buffer processing resources against supply or demand variability and uncertainty.
2. Capacity timing is deciding on when to increase or reduce resources. It specifies the availability of capacity and the timing of capacity adjustments, both expansions and contractions.
3. Capacity-type decisions characterize the type or nature of each resource. For example, is it a human (labour) or capital resource? To what extent can a capital resource operate unsupervised; that is, what is the level of automation? What is the range of tasks that it can handle, from single-task (specialized) to multi-task (flexible)?
4. Capacity location decisions specify where resources should be located. Capacity location deals with finding appropriate geographical sites and assigning roles to them. Indeed, location decisions are part of network strategy. Network strategy also includes topology or configuring connections between locations. For example, many airlines use a hub-and-spoke or star topology for aeroplane routing, while most automotive companies use a tiered supply network or tree topology. Interconnections also specify the logistics (transportation) arrangements.

## The process view of operations and process decisions

The purpose of resources is to work and generate value. The *process view* shows how the resource portfolio is utilized and allocated to activities with the intent of adding value. Flow charts and value stream maps are graphical representations of the process view of an organization.

Processes are structured, recurrent activities that transform inputs into outputs. Some processes are well defined and documented, while others are less so and are called routines. A process is a network of activities with specific precedence relationships among the activities – the relationships that specify which activities must be finished before another activity can begin. The terms process and routines embody an element of repetition but focus on the positive aspects: practice makes perfect, and recurrent execution makes analysing and improving operations a worthwhile investment.

The process view considers an organization (or any of its parts) to be an activity network or a collection of processes. A process can refer to detailed workflow, such as billing a customer or implementing an engineering change order, or to aggregate activities such as new product development or customer service. Adopting a process view means that we visualize instances of work, called flow units (e.g., consulting engagements, patients or orders), flowing through a network of activities and buffers. Buffers store flow units that have finished one activity but are waiting for the next activity to start (Anupindi et al., 2012). This primary workflow is typically accompanied by an information flow (to coordinate the activities) and a cash flow (to support and reward them).

By necessarily starting with inputs (expressed customer demands) and ending with outputs (served customer demands), the process view is compatible with a customer-centric view of the world. Value stream mapping emphasizes this customer-centric view and defines value from the perspective of the customer: a value-added activity is an activity that benefits the customer. The process view is a horizontal view of the organization that cuts through functional silos such as finance, accounting, production, marketing and sales. It emphasizes crucial interfunctional relationships among internal parties, as well as the interfaces and relationships with external customers and suppliers.

By equating organizations with processes, the business process re-engineering paradigm of the early 1990s has put operations on the agenda of top management at many organizations. By capturing both structure (or architecture or design) and execution, the process view is useful for analysing the division and specialization of work following the dictum of Adam Smith, as well as for coordinating and evaluating execution. For example, how is the

auto manufacturing process divided and coordinated between the original equipment manufacturer (OEM) and its suppliers? Given a process structure, what is the total marginal cost of the car manufacturing process from inputs to a finished vehicle? How long is an average consulting engagement from start to completion?

The process and resource views are complementary: the process view focuses on how work is done, while the resource view focuses on who or what performs the work. Both views are necessary to have a good understanding of operations: viewing the firm as a sequence of activities without considering its resources gives as incomplete a picture as viewing the firm as a collection of resources without considering how those resources are put to use.

To configure its processes, the organization must make (at least) four key decisions:

1. Supply or sourcing decisions specify which activities are performed internally, which are outsourced, and how to manage suppliers. They define the process boundaries or interfaces and relationships with suppliers. This includes strategic sourcing decisions such as outsourcing (which activities are provided by third parties?), vertical integration (how far do we extend our activities upstream and downstream?), and supply network configuration (how many suppliers do we use and have relationships with?).
2. Technology decisions characterize how to process inputs to outputs. It includes the methods and systems employed, as well as the know-how and intellectual property. This 'bucket' of technology decisions is arguably the biggest as it could capture most of operations management. For example, there are four key types of technology:
   a. Coordination and information technology determines how we coordinate, communicate and plan execution throughout the activity network. Coordination is a typical managerial activity and includes the assignment of responsibility, incentives, measurement and control. For example: do we have tightly centralized or distributed control? Coordination is obviously important during planning. For instance, managers often fail to coordinate financial forecasts, sales forecasts, marketing forecasts and operations forecasts. Collaborative planning and forecasting systems aim to correct this mistake. Coordination is equally important during execution: much of the challenge in managing operations is making events happen at the right times. Finally, coordination depends strongly on information technology such as communication technology (e.g., the Internet, radio frequency identification (RFID)) and planning systems (e.g., enterprise resource planning (ERP)).
   b. Product technology describes the design philosophy, product architecture and product capabilities (often as perceived by the customer). Is the product designed in modules or as a single integral system? To what extent does the design take into account manufacturability, testability, or reusability?
   c. Process technology describes the structure of the conversion process and methods used in its execution. Network structure describes the layout of the activity network in terms of locations of activities, buffers and interconnections. For example, processes can be organized by activity or by product line. Job shops such as consulting companies and tool-and-die shops often have a functional or process layout, whereas flow shops such as car assembly plants and chemical processing plants usually have a product layout. Networks strategy also specifies whether processes should be standardized or localized.
   d. Transportation technology describes how goods are exchanged among different activities in the network. It is a key driver in logistics and supply chain management, but can also describe how insurance policies are moved between the different processing steps.
3. Demand decisions specify how to match demand to available supply. They characterize the interfaces and relationships with customers and include demand planning and forecasting as well as tactical capacity allocation and order management. Demand management is an important driver in inflexible supply processes that cannot quickly adapt to changes in demand, such as the core processes in airlines, hotels and car rental companies. It also relates to service and customer relationship management (CRM), which are the processes involving any interaction with customers.
4. Improvement and innovation decisions characterize the processes and incentives to improve and

innovate products and processes. They involve not only research and development activities, but also broader continuous improvement and learning throughout the organization.

## The competency view of operations and competency decisions

The specific choice of resources and processes affects what the operations system can and cannot do well. This operational system, together with the vaguer, but at least as important, concept of values, characterizes the competencies of the organization.

Besides resources and processes, values are the third factor that affects what an operation – and thus an organization – can and cannot do. Christensen and Overdorf (2000) define values as the standards by which employees set priorities. Certainly some priorities are embodied or programmed into a process but many are not, even though prioritization decisions are made by employees at every level. Examples include judging whether an order or customer is attractive or not, whether a suggestion to improve a product or process is attractive or marginal, and whether an investment is worth making or not.

As organizations become more complex, consistent values are powerful mechanisms for employees to make independent but consistent decisions about priorities. As successful companies mature, employees often start believing that the processes and priorities they have often used so successfully are the right way to do their work. Once that happens and employees begin to follow processes and decide upon priorities by assumption rather than by conscious choice, those processes and values come to constitute the organization's culture.

*The competency view* characterizes the abilities of the ensemble of the organization's resources, processes and values. Competencies determine the set of outputs, products and services that the operation will be particularly good at providing. They can be measured along multiple dimensions, including:

1. Cost: The marginal and total cost of operating, including variable and fixed costs, are particularly important in competitive markets such as commodities and low-margin businesses. The relevant cost metric depends on the decision and the setting and can be tracked through cost accounting systems (be careful to understand depreciation and allocation schemes) or may need careful measurement or estimation. All activities bear on cost, but this competency most naturally reflects scale economies (capacity sizing) and complexity costs (capacity types).
2. Time: The total flow, response and lead time characterize the time needed to transform inputs into outputs, to fill a customer order, and to receive inputs, respectively. Flow time and lead time determine working capital requirements and forecasting accuracy. Responsiveness is important in service and convenience-driven businesses, as well as in rapidly changing environments.
3. Quality refers to the degree of excellence of the process, product or service. It has design-related dimensions such as performance and features, as well as process-related dimensions such as durability and reliability. Quality is a key differentiator in luxury and high-precision businesses and a required competency in mature industries.
4. Flexibility measures the ability to change inputs, activities, volumes or outputs. Similar to quality, flexibility has several dimensions such as scope flexibility (the selection or range of products and services offered, including the level of customization), volume flexibility and robustness. It is also a key risk mitigation driver.

Depending on the interest of study, one can add innovation as a separate competency or as 'mega' flexibility – the ability of the operation to change, improve and innovate.

The resource, process and competency views provide a 360-degree perspective on operations. The competency view is the most 'outward-looking' and begs the important question: *which* competencies should an operation have, nurture or develop? This naturally connects to competitive strategy, which directly inspires our framework.

## Putting it all together: A framework for operations strategy

In principle, operations strategy could emerge from a giant optimization programme that automatically identifies the resources, processes and competencies that maximize the net present value of the organization. However, it is not entirely clear how to measure the value of a not-for-profit organization. In addition, this quantitative approach cannot yet (and likely never will) formulate comprehensive strategies:

the search space of all possible resource, process and competency configurations cannot easily be represented mathematically, let alone be summarized into one financial measure that can be optimized.

Operations strategy therefore starts with qualitative arguments to characterize the appropriate types of resources, processes and competencies. Subsequently, if more specificity is needed or desired, value maximization can be used to optimize over that restricted search set.

A key qualitative argument is provided by the principle of alignment or strategic fit, which is at the foundation of our operations strategy framework. The term operations strategy implies that it relates to competitive strategy and to operations. But what precisely should this relationship be? One of the oldest ideas in the strategy literature is that the appropriateness of a strategy can be defined in terms of the fit, match or alignment of organizational structure and resources with the environmental opportunities and threats (Chandler, 1962; Andrews, 1971). This idea is sufficiently important to be called

> Principle (Alignment): Operations strategy should develop resources and configure processes such that the resulting competencies are aligned with the competitive position that a firm seeks over time. (Van Mieghem, 2008: 18)

The existence of trade-offs and constraints in the operations system implies that no single operation can be universally appropriate; rather, each organizational strategy requires a *tailored operating system*: its resources and processes are configured such that its competencies best fit the customer value proposition specified by the competitive strategy. The necessity of making choices in strategy is reflected in making choices in operational competencies. This is beautifully captured by a sign displayed at a restaurant in Puerto Morelos, Mexico:

> We do three types of jobs here: GOOD, FAST and CHEAP. You may choose any two!
> If it is good and cheap, it will not be fast.
> If it is good and fast, it will not be cheap.
> If it is fast and cheap, it will not be good.

The principle of alignment extends to the entire organization. McKinsey consultants Drew, McCallum and Roggenhofer (2004) argue that the operating system must be aligned with what they call the management infrastructure (meaning organization, leadership and performance systems) and the mindsets and behaviours (meaning values) of the organization. You may think of the operating system as the engine of a car: as high-powered as it may be, it won't go in the right direction without the appropriate dashboard information systems and a willing driver.

The principle of strategic fit directly inspires a three-step framework for formulating operations strategy:

1. How does the organization seek to compete and provide value to its customers? For each targeted customer segment, how is the customer value proposition prioritized around price, time, quality and variety (or choice)?
2. What must operations do particularly well? For each targeted customer segment, how are the operations' competencies prioritized around cost, flow time, quality and flexibility?
3. Which resources and processes best provide that competency prioritization? For each targeted customer segment, how are the asset portfolio (sizing, timing and location of each resource type) and the activity network (supply, technology, demand and innovation management) configured?

The sequence in which these questions are answered reveals a different perspective on operations strategy.

The market perspective first decides on competitive strategy and then specifies the competencies that operations strategy must develop by selecting and configuring the appropriate resources and processes. Behind this perspective is the premise that 'structure follows strategy' (Chandler, 1962). This top-down and outside-in perspective ensures that operations and all parts of the organizations reflect the intended market position, and tends to create a customer-driven organization.

The resource and process perspective approaches the framework in the reverse sequence. This bottom-up and inside-out perspective starts from the premise that the building blocks of strategy are not products and markets, but processes and resources. This perspective ensures that the value proposition offered to customers can be well executed with the given operations. It tends to create a resource-driven organization.

As environments, strategy and operations evolve, organizations must seek to maintain alignment by

adopting both perspectives over time. In order to satisfy a new customer need, the firm may need to build new competencies, resources and processes. Those processes and resources may later be used to invent new products and services that may drive, if not create, new markets. Iterating through both perspectives ensures a continual fit between internal competencies and external demands and competitive situations. Consequently, 'dynamic alignment' requires a continual process of adaption to ensure that operations and competitive strategy remain aligned over time.

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**See also**

DIVISION OF LABOUR; FIRM RESOURCES; MAKE-OR-BUY DECISION; PROCESS-ORIENTED STRATEGIC THEORY

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**Non-Print Items**

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**Additional index items**
processes and process management
value stream mapping
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