Chapter 1

Discovering the Fundamentals of Operations Management

In This Chapter

- Understanding the function and value of operations management
- Getting a handle on business models and processes
- Facing key challenges in operations management

Operations — a set of methods that produce and deliver products and services in pursuit of specific goals — are the heartbeat of every kind of organization, from iron foundries and hospital emergency wards to high finance and professional services. Well-designed operations enhance profitability. Poor operations, at best, equal ineffective processes and wasted resources. At worst, poor operations can drive a company out of business. Therefore, managing operations with competence is vital to meeting strategic goals and surviving financially.

In this chapter we point out what's part of operations and what isn't. We also describe key concepts in the world of operations and tell you what you can do to improve operations in a business or any other type of organization.

Defining Operations Management

When most people think of operations management, if any picture comes to mind at all, an image of a large factory billowing smoke often emerges. And, yes, factories that billow smoke are indeed performing operations, but

they're only a small subset of everything that's involved with operations management. Ultimately, operations determine the cost, quality, and timing of every interaction an organization has with the people it serves.

In this section we tell you exactly what operations management is — and what it's not. Moreover, we point out why operations are such a critical part of an organization and why all departments must care about operations for an organization to be successful.

Getting beyond the smokestack

No job is so simple that it can't be done wrong.

—Message in a Chinese fortune cookie

Operations management is the development, execution, and maintenance of effective *processes* related to activities done over and over, or to one-time major projects, to achieve specific goals of the organization.

Operations management covers much more than smokestacks or manufacturing parts and products; it also encompasses services and all sorts of projects and initiatives that groups of people undertake together. From restaurants and fast-food joints to medical services, art galleries, and law firms, operations management ensures that organizations minimize waste and optimize output and resource use for the benefit of customers as well as everyone else with skin in the game, or the *stakeholders*.

Doing something a little inefficiently one time is no big deal, but when you do something inefficiently over and over, hundreds or even millions of times per year, even little mistakes can add up to very expensive amounts of waste. Mistakes in an operation that result in defective products, even if they represent only 1 percent of total output, can alienate millions of customers. Similarly, if poorly designed operations result in habitually serving customers late, a company will eventually lose customers to better-functioning competitors.

In for-profit firms, operations management is concerned with the cost-effective operation and allocation of resources, including people, equipment, materials, and inventory — the stuff you use to provide goods or services for customers — to earn the big bucks and maximize your return on investment. Just look at the annual reports of big successful firms. Some, like ExxonMobil, take pride in their operational excellence. In the case of ExxonMobil, just 1 or 2 percentage points better energy efficiency or plant up-time can represent millions in additional profit.

In nonprofit organizations, managing resources is also vital. Here, operations management may be concerned primarily with maximizing a specific metric, such as people served while staying out of the red.

Seeing the relevance of operations management

Operations management is a fundamental part of any organization. In fact, *Forbes* magazine reported in 2011 that about three quarters of all CEOs came from an operations background. Not all these CEOs studied operations in school; only some of them did. Many majored in finance, marketing, information systems, or engineering and ended up in operations at some point in their careers.

Even if you don't want to be a CEO or ever work in operations, you'll probably have to work with operations people during your career. So consider these facts about the impact of operations on various business functions:

- **Engineering:** Engineers are notoriously great with numbers and focus. That doesn't always translate to being great with operations. Operations analysis is both quantitative and intuitive, and engineers without operations training can — and do! — waste millions of dollars when tasked to oversee operations. For maximum benefit, you need to evaluate the individual process in the context of the overall system of processes it connects to. So some operations knowledge can help engineers place their analysis of an individual process into an overall context of the operations system.
- **Finance:** Corporate finance folks exercise oversight over budgets, so having some operations knowledge can help this team make good decisions. For instance, when an operations leader asks for money to *de-bottleneck* a process (check out Chapter 3 for information on bottlenecks), knowing what this means tells you the intent is to increase the capacity of an existing operation. This almost always makes more economic sense than building a new plant. It also makes it easier to evaluate costs and benefits of the investment. Otherwise, you may suspect it's like spending money to put paint on an old jalopy.
- **Information technology (IT):** A big part of IT within some companies is to automate operations. Knowing the core principles of operations can help these folks build an operations superhighway instead of paving a cow path. Companies tend to easily accept the traditional way of doing things without question. There's a great temptation to simply automate an existing process with imbedded inefficiencies. Some knowledge of operations may help IT professionals to more effectively partner with operations management people to truly create competitive advantage by improving processes while they automate.
- **Marketing:** When the marketing folks come up with a new product idea or promotions concept, they need to talk to operations to find out

whether it can be produced profitably. If the answer is no — operations managers are sometimes a grumpy lot — persuading them to find a solution may be easier if marketing can speak the language of operations and understand their concerns.

Understanding the Process of Operations

The field of operations management isn't always intuitive. Ultimately, the intent is to eliminate waste and maximize profitability. Depending on the type of organization and its specific goals, operations can be managed with a wide range of strategic approaches and techniques.

This section describes some of the major aspects of operations that often trip up people who study and work in this field.

Driving the business model

An organization's business model should influence operations strategy; likewise, operations strategy drives the business model (see Figure 1-1). The *business model* — which identifies the target market, the product or service available for sale, pricing, marketing, and overall budget — is intimately entwined with operations.

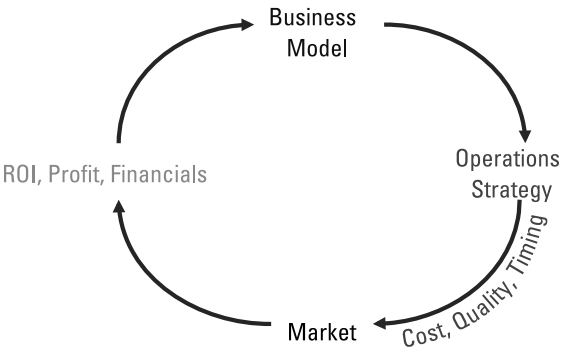

Illustration by Wiley, Composition Services Graphics

Figure 1-1: The business model drives operations, and operations drive the business model.

In other words, operations determine the cost, quality, and timing of the value proposition that a company delivers to its customers. Operations determine the customer experience, whether it's a service or a tangible product. If the customer experience is good, then financials also tend to be good — and there are always ways to further improve the business model (much more on continuous improvement later). If, on the other hand, operations and the customer experience are poor, then financials are also likely to be poor. This situation calls for a reevaluation of the business model, the operations strategy, or both.

In the pragmatic gray area of the real world, operations at a company may be independently good in some areas but out of alignment with the business model. For example, if the operations strategy emphasizes low cost, but the business model relies on using customization to obtain a higher markup from customers, then a company is functioning with fundamentally incompatible goals, making the "good" operations ineffective.

Recognizing the diversity of processes

Processes vary in thousands of ways for different kinds of organizations with different kinds of needs. Start-up firms need to scale up rapidly, and the restaurant business requires some artistry. Pharmaceutical companies must stay focused on strict regulations, and firms in the personal computer industry need to worry about their products' shelf life (find details on the product life cycle in Chapter 18). To manage operations effectively, you need to understand a company's processes in context of its business model and industry.

This section highlights some important characteristics of organizations that can help illustrate the nature of certain processes.

Customer interface

Processes vary quite a bit based on the amount of face time with customers they involve. Service processes that don't directly interface with customers, such as reconciling checks, are more like manufacturing processes than processes that involve interaction with customers. After all, reconciled checks, like pizzas or widgets, don't become upset if the resource processing them doesn't smile. Nor do they get confused by poor signage, waiting in line, or bad process design.

The customer interface aspect of operations also differs based on whether the customer is the end consumer, known as a *B2C relationship,* or another business, or *B2B relationship:*

- B2C firms tend to market products to a lot of customers who each purchase a small quantity of units.
- B2B firms tend to deal with a small number of customers with high quantity demands that require heavy customization and significant customer service.

In general, business customers are much less forgiving of late deliveries than end consumers.

Scale

The scale of an operation definitely impacts operations. Producing thousands of parts or serving thousands of customers per hour is quite different from handling only a few. If a company is working by the thousands, then automation may make a lot of sense because the fixed costs of automation can be spread out over many customers. A low-volume operation typically requires more flexible processes, which may rule out automation.

Customization

If a company's product or service is highly customized, then flexibility in processes is extremely important. Automation may not be practical. Producing products before a customer places an order is also impractical in many of these situations, and this may prevent a business from obtaining *economies of scale,* which refers to the fact that it becomes increasingly cheaper to produce a unit of something as unit volume grows. Customizing products usually means higher production costs per unit and higher prices for customers.

Customer priorities

Successful businesses know what matters most to their target customers: time, cost, or quality. If time is most important, you may try to produce the product before the customer orders it. If cost is the priority, maximizing economies of scale — possibly through level production runs or outsourcing (covered in Chapter 17) — is critical. An emphasis on quality may require more expensive materials and equipment to make the product.

Managing processes

Although processes vary in many ways, they also share some common characteristics that apply across a broad spectrum of operations.

Nearly all processes in operations have three major components:

- **Inventory:** This includes not only the *finished goods inventory* (products that are complete) but also jobs (products or services) that are only partly complete in your process (known as *work in progress,* or WIP).
- **Materials:** These are the items needed to make a product or provide a service.
- **Resources:** The equipment, information systems, and people in an operation that make the product or provide the service are considered resources.

Assuming that the business model is aligned with operations strategy, effectively managing inventory, materials, and resources achieves the two goals of operations management: efficiency and risk management. Here are some ways to manage these laudable goals:

- **Standardize the process and draw it out.** Before you try to modify any process, standardize it and all the operations within it. Drawing a standardized process is the first step of process management (see Chapter 2). And don't get hung up on making this perfect. Even a rough process drawing can help you spot trouble points in the process, and the drawing can be perfected later as you work to improve the process.
- **Use resources effectively.** The key to utilizing resources effectively is to find the bottleneck. The *bottleneck* is the resource that limits the capacity of a process, and it can be surprisingly hard to find. It's not necessarily the biggest machine in a process or the most expensive person you employ; it's simply that operation that is the slowest or most rate-limiting in the whole process chain.

  

  The best way to find the bottleneck is to determine which resource on average spends the most time working on each job (unit of product) that's completed by your process (find more on bottlenecks in Chapter 3).

  If you need more capacity, make sure to add it at the bottleneck; adding it anywhere else doesn't help and just wastes it. For non-bottleneck resources, resist the temptation to utilize them 100 percent of the time on the same job (unit of product) because this just ends up creating WIP that builds up.
- **Keep material moving.** Try to minimize the amount of time a job waits around in the process. This is especially important in face-to-face services or when a product is made to order, but using material quickly also matters in standard manufacturing. WIP is essentially tied-up cash that could be used for better purposes (such as collecting interest!). (Flip to Chapter 3 for details.)

- **Keep the process simple.** One mark of a simple process is an easy-to-read process flow diagram (check out Chapter 2 for advice on how to draw a process flow diagram). Complex processes are hard to schedule and manage; they accumulate lots of WIP and hide defects (see Chapter 5 for tips on simplifying processes).
- **Hedge against variability.** Variability in demand is a big problem for process management. If the company sells tangible product from a finished goods inventory, a company can carry extra inventory to ensure that unexpected surges of customer demand are satisfied. However, big inventories are costly. (See Chapter 6 for how to forecast demand and Chapter 8 to set inventories.) Extra capacity to make more finished goods is another tool for managing demand variability and is particularly critical in face-to-face services and make-to-order businesses. But capacity, too, can be pricey. (Find details on capacity in Chapter 7.) Finding the right balance of tools to handle demand variability can provide one of the biggest paybacks from operations management.

- **Don't fall in love with technology.** Avoid the misdirected comfort of assuming that just buying the fanciest information system can solve a company's slew of operational problems. The right technology and aggregate planning (see Chapter 9) can help, but these support tools are not cure-alls; they can't compensate for a basic mismatch of capacity with demand.
- **Manage the supply chain.** A product or service is only as good as the weakest link in the *supply chain,* the network of suppliers that provide the materials, services, and logistics that support an organization (see Chapter 10). If a company can make suppliers into actual partners in the business and integrate them tightly into product development and productivity improvement efforts, profitability follows (see Chapter 11).
- **Improve quality.** Figuring out what the customer actually wants and delivering it is everything in business (flip to Chapter 12). Continuously improving the quality of processes is necessary to keep up with changing customer expectations. Better quality can also reduce waste and improve profitability. Chapter 13 covers quality improvements.
- **Realize it's a system thing.** Operations aren't about doing one thing right. They're about doing a lot of things right — at the same time. This means using resources and materials efficiently, producing high quality goods, and maintaining a reliable supply chain while keeping things simple and managing risk. Got all that? Chapter 11 presents one especially effective way to achieve this: the lean process methodology.

Handling special situations

Operations managers must sometimes cope with a number of special situations. These range from one-off projects to outsourcing processes and may include managing immature or obsolete products. Here's some advice on managing special situations.

One-off projects

Though most of this book concentrates on *processes* (things that a company does over and over), operations managers must often deal with projects that are executed only once. However, some projects are big enough and occur often enough that reusable processes for managing them can emerge (see Chapter 14).

Planning is important for any operation, but even more so for projects. Mistakes or failures in upfront planning can't be gradually fixed through later tweaks the way they can be for routine ongoing processes. (For information on planning projects, see Chapter 15.) Another part of the problem is that, by definition, a one-time project hasn't been done before, so upfront estimates need to be created without data from past performance. This is part of the reason that so many projects are completed late, over budget, or both. (Find more on project estimation in Chapters 15 and 16.) Allowing for estimate error and planning for contingencies are critical parts of project planning.

Good project management also requires aggressive risk management. Because projects aren't repetitive processes, risks can be harder to identify and manage. Fortunately, a few good tools are available; among them are risk registers to help identify, mitigate, and track risks. (Check out Chapter 16 for more on risk.)

Outsourcing

There are a lot of good reasons to outsource, but outsourcing isn't a panacea for poorly considered business models and operations planning. Companies need to carefully identify what work to perform in-house and what to outsource. Then, after an outsourcing relationship is established, a structure to manage it effectively is vital. Be sure to figure out how to manage contracts, specifications, managerial and co-located personnel, and information-sharing structures. (Outsourcing is the focus of Chapter 17.)

Product life cycles

Operations must adapt to the product life cycle. For products at an early stage of the life cycle, companies need to put a premium on flexibility for processes. As the product or service takes off and enters its growth phase,

operations become more about scalability. When a product is mature, reducing costs while maintaining quality is the main focus. And as the product declines, the challenge is to figure out how to reduce commitment to the product without alienating customers. (Find more about product life cycle issues in Chapter 18.)

Meeting the Challenges

The mountain of challenges to implementing good operations management may seem daunting, but a healthy dose of common sense and old-fashioned experience can help you chip away at them bit by bit. In this section, we describe some common operations management challenges and point out why it's important to overcome them.

Firefighting

The field of operations management is packed with adrenaline junkies and pressure hounds. But crises provide a high potential for inefficiency, mistakes, and customer disappointment. The goal of an operations manager is to create processes that respond smoothly to pressure so crises don't erupt.

Technology

Despite what many people may believe, automation and computerization aren't the best answers to every problem in the world of operations. After all, an automated bad process is still a bad process. In fact, automation may make a bad process even worse because automating often hides problems and makes some issues more difficult to solve. Fix the process first and then automate it.

Similarly, enterprise management software (EMS) systems can't improve a company's processes. As with most data systems, garbage in equates to garbage out. An EMS system, no matter how expensive it is, can't improve a bad process. So clean up the process and then bring in the information technology to help the new process along if appropriate.

Complacency

People in various parts of an organization may assume that what happens in operations is simple. Operations managers may get resistance when they try to standardize, measure, or improve processes. A common retort to process improvement efforts is, "We've always done it this way, so why change?" But if a process is costing money for the firm to complete, then it's worth trying

to do it more efficiently and less expensively. If the process is sometimes done wrong, then it's costing even more — money or maybe even customers. No business can afford not to take the time to standardize, measure, and improve processes.

Metrics

For one reason or another, some organizations use performance metrics in ways that can be counterproductive to good operations. For example, *utilization,* or how busy your resources are, is often a defining metric in operations. Logically this seems to make sense, because who wouldn't want the resources working as much as they could? However, over-utilization often leads to excessive inventory.

As a metric, utilization is a good idea — but sometimes only in the abstract. For example, labor utilization at a workstation measures how many hours a company is paying its people versus how many work hours are going into the parts at the workstation. When this metric is divorced from its context, real problems can emerge. Any non-bottleneck resource that's working faster than the bottleneck is just going to create excess WIP that ties up cash, increases defects, and reduces material usage efficiency (see Chapter 3).

Say one workstation is already working faster (putting the wheels on toy cars, for example) than the next workstation (painting the toy cars in different colors) in the process. If you increase labor utilization at the wheels workstation, you're just going to increase the pile of unpainted cars. So you want to move some of the workers from wheels to painting to improve the overall productivity.

In short, any metric that's stripped from its context may be lying to you. The only important question is this: Is the change you're proposing going to make more money for the firm over the long run?

Perspective

Possibly the most important source of information for improving operations is a company's line workers and front-line staff. Curiously, these valuable people seem to be neglected in the process of designing processes and fine-tuning operations, yet they have the most accurate information about how things really work.

An operations manager may be better educated than the line workers, but no one knows the challenges and opportunities of producing a product or delivering a service better than those who actually do the work. That's why

every legitimate process improvement methodology leverages the line workers' knowledge (see Chapter 13). And if a company ignores employees' suggestions on how to improve its processes, it runs the risk of demotivating the very people who make the process run.

Outsourcing

The idea that outsourcing everything and becoming a marketing company is a viable strategy is a very real challenge for operations professionals. Outsourcing can be a good way for a company to reduce cost and improve quality by leveraging the expertise of its supply chain. However, by outsourcing critical operations, a firm can lose its competitive advantage and open the market door to competitors. For more on how to decide what operations to outsource, see Chapter 17.