

20.1: Reading- Operations Management in Manufacturing and Production

The Challenge: Producing Quality Jetboards

The product development process can be complex and lengthy. It took sixteen years for Bob Montgomery and others at his company to develop the PowerSki Jetboard, and this involved thousands of design changes. It seemed worth it: the Jetboard, an exciting, engine-propelled personal watercraft that's a cross between a high-performance surfboard and a competition water-ski/wakeboard, received extensive media attention and earned rave reviews. It was showered with honors, including *Time* magazine's "Best Invention of the Year" award. Stories about the Jetboard appeared in more than fifty magazines around the world, and it appeared in several movies, in over twenty-five TV shows, and on YouTube.^[1] One reviewer of the Jetboard exclaimed, "Up, up and away. PowerSki's the closest you'll get to being Superman on the water. With 40 hp under your toes, the 100-pound board literally flies. You supply the cape."^[2]

Montgomery and his team at PowerSki enjoyed taking their well-deserved bows for the job they did designing the product. But having a product was only the beginning for the company. The next step was developing a system that would produce high-quality Jetboards at reasonable prices. Before putting this system in place, PowerSki managers had to address several questions: What kind of production process should they use to make the Jetboards? How large should their production facilities be, and where should they be located? How should the plant be laid out? Should every component be made in-house, or should some be furnished by subcontractors? Where should they buy the materials they needed to build Jetboards? What systems would they need to ensure that production was as efficient as possible and that quality standards were maintained? Answering these questions helped PowerSki set up a manufacturing system through which it could accomplish the most important task that it had set for itself: efficiently producing quality Jetboards.



Like PowerSki, every organization—whether it produces goods or provides services—sees job number one as furnishing customers with quality products. Thus, to compete with other organizations, a company must convert resources (materials, labor, money, information) into goods or services as efficiently as possible. The upper-level manager who directs this transformation process is called an *operations manager*. The job of operations management (OM), then, consists of all the activities involved in transforming a product idea into a finished product, as well as those involved in planning and controlling the systems that produce goods and services. In other words, operations managers manage the process that transforms inputs into outputs. Figure 20.1.1 below illustrates this traditional function of operations management.

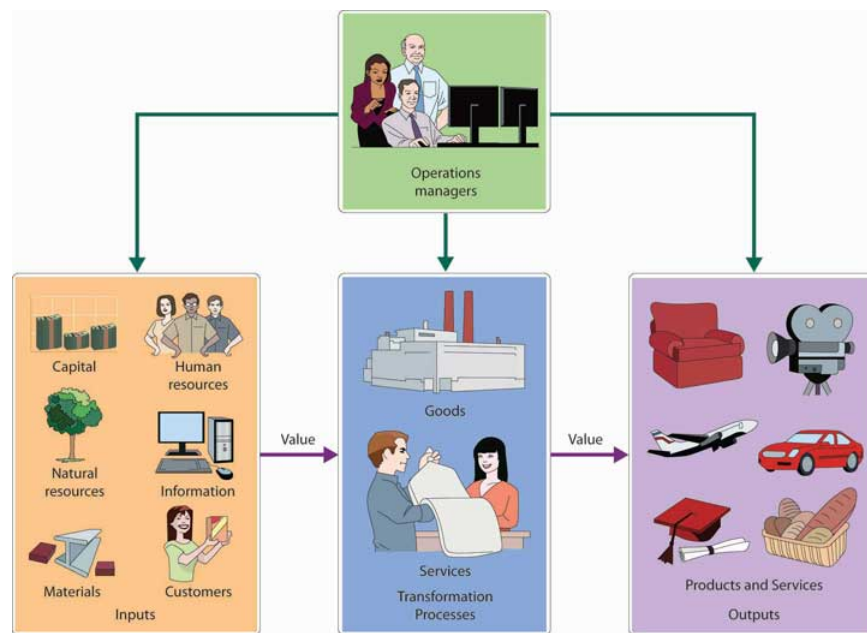


Figure 20.1.1: The Transformation Process

In the rest of this module, we'll discuss the major activities of operations managers. We'll start by describing the role that operations managers play in the various processes designed to produce goods and offer services. Next, we'll look at the production of goods in manufacturing firms; then, we'll describe operations management activities in companies that provide services. We'll wrap up by explaining the role of operations management in such processes as quality control and outsourcing.

Operations Management in Manufacturing

Like PowerSki, all manufacturers set out to perform the same basic function: *to transform resources into finished goods*. To perform this function in today's business environment, manufacturers must continually strive to improve operational efficiency. They must fine-tune their production processes to focus on quality, to hold down the costs of materials and labor, and to eliminate all costs that add no value to the finished product. Making the decisions involved in the effort to attain these goals is the job of the operations manager. That person's responsibilities can be grouped in the following way:

- **Production planning.** During production planning, managers determine how goods will be produced, where production will take place, and how manufacturing facilities will be laid out.
- **Production control.** Once the production process is under way, managers must continually schedule and monitor the activities that make up that process. They must solicit and respond to feedback and make adjustments where needed. At this stage, they also oversee the purchasing of raw materials and the handling of inventories.
- **Quality control.** Finally, the operations manager is directly involved in efforts to ensure that goods are produced according to specifications and that quality standards are maintained.

Let's take a closer look at each of these responsibilities.

Planning the Production Process

The decisions made in the planning stage have long-range implications and are crucial to a firm's success. Before making decisions about the operations process, managers must consider the goals set by marketing managers. Does the company intend to be a low-cost producer and to compete on the basis of price? Or does it plan to focus on quality and go after the high end of the market? Perhaps it wants to build a reputation for reliability. What if it intends to offer a wide range of products? To make things even more complicated, all these decisions involve tradeoffs. Upholding a reputation for reliability isn't necessarily compatible with offering a wide range of products. Low cost doesn't normally go hand in hand with high quality.

With these factors in mind, let's look at the specific types of decisions that have to be made in the production planning process. We've divided these decisions into those dealing with production methods, site selection, facility layout, and components and materials management.

Production-Method Decisions

The first step in production planning is deciding which type of production process is best for making the goods that your company intends to manufacture. In reaching this decision, you should answer questions such as the following:

- How much input do I receive from a particular customer before producing my goods?
- Am I making a one-of-a-kind good based solely on customer specifications, or am I producing high-volume standardized goods to be sold later?
- Do I offer customers the option of “customizing” an otherwise standardized good to meet their specific needs?

One way to appreciate the nature of this decision is by comparing three basic types of processes or methods: *make-to-order*, *mass production*, and *mass customization*. The task of the operations manager is to work with other managers, particularly marketers, to select the process that best serves the needs of the company’s customers.

Make-to-Order

At one time, most consumer goods, such as furniture and clothing, were made by individuals practicing various crafts. By their very nature, products were *customized* to meet the needs of the buyers who ordered them. This process, which is called a make-to-order strategy, is still commonly used by such businesses as print or sign shops that produce low-volume, high-variety goods according to customer specifications.

Mass Production

By the early twentieth century, however, a new concept of producing goods had been introduced: mass production (or make-to-stock strategy) is the practice of producing high volumes of identical goods at a cost low enough to price them for large numbers of customers. Goods are made in anticipation of future demand (based on forecasts) and kept in inventory for later sale. This approach is particularly appropriate for standardized goods ranging from processed foods to electronic appliances.

Mass Customization

But there’s a disadvantage to mass production: customers, as one contemporary advertising slogan puts it, can’t “have it their way.” They have to accept standardized products as they come off assembly lines. Increasingly, however, customers are looking for products that are designed to accommodate individual tastes or needs but can still be bought at reasonable prices. To meet the demands of these consumers, many companies have turned to an approach called mass customization, which (as the term suggests) combines the advantages of customized products with those of mass production.

This approach requires that a company interact with the customer to find out exactly what the customer wants and then manufacture the good, using efficient production methods to hold down costs. One efficient method is to mass-produce a product up to a certain cutoff point and then to customize it to satisfy different customers.

The list of companies devoting at least a portion of their operations to mass customization is growing steadily. One of the best-known mass customizer is Nike, which has achieved success by allowing customers to configure their own athletic shoes, apparel, and equipment through Nike’s iD program. The Web has a lot to do with the growth of mass customization. Levi’s, for instance, lets a woman find a pair of perfect fitting jeans by going through an online fitting process that first identifies her “curve” type: *slight* (straight figure), *demi* (evenly proportioned), *bold* (curvy figure, which experiences waist gapping in the back), and *supreme* (curviest shape, which needs a higher rise in the back). Oakley offers customized sunglasses, goggles, watches, and backpacks, while Mars, Inc. can make M&M’s in any color the customer wants (say, school colors) as well as add text and pictures to the candy.^[3]

Naturally, mass customization doesn’t work for all types of goods. Most people don’t care about customized detergents or paper products (although a customized Kleenex tissue box with your picture on it and a statement that says, “go ahead . . . cry over me!” might come in handy after a relationship breakup with your significant other.^[4] And while many of us like the idea of customized clothes, footwear, or sunglasses from Levi’s, Nike, or Oakley, we often aren’t willing to pay the higher prices they command.

Facilities Decisions

After selecting the best production process, operations managers must then decide where the goods will be manufactured, how large the manufacturing facilities will be, and how those facilities will be laid out.

Site Selection

In choosing a location, managers must consider the following factors:

- To minimize shipping costs, both for raw materials coming into the plant and for finished goods going out, managers often want to locate plants close to suppliers, customers, or both.
- They generally want to locate in areas with ample numbers of skilled workers.
- They naturally prefer locations where they and their families will enjoy living.
- They want locations where costs for resources and other expenses—land, labor, construction, utilities, and taxes—are low.
- They look for locations with a favorable business climate—one in which, for example, local governments might offer financial incentives (such as tax breaks) to entice them to do business in their locales.

Managers rarely find locations that meet all these criteria. As a rule, they identify the most important criteria and aim at satisfying them. In deciding to locate in San Clemente, California, for instance, PowerSki was able to satisfy three important criteria: (1) proximity to the firm's suppliers, (2) availability of skilled engineers and technicians, and (3) favorable living conditions. These factors were more important than operating in a low-cost region or getting financial incentives from local government. Because PowerSki distributes its products throughout the world, proximity to customers was also unimportant.

Capacity Planning

Now that you know *where* you're going to locate, you have to decide on the quantity of products that you'll produce. You begin by *forecasting* demand for your product. As you may know, forecasting isn't easy. To estimate the number of units that you're likely to sell over a given period, you have to understand the industry that you're in and estimate your likely share of the market by reviewing industry data and conducting other forms of research.

Once you've forecasted the demand for your product, you can calculate the capacity requirements of your production facility—the maximum number of goods that it can produce over a given time under normal working conditions. In turn, having calculated your capacity requirements, you're ready to determine how much investment in plant and equipment you'll have to make, as well as the number of labor hours required for the plant to produce at capacity.

Like forecasting, capacity planning is difficult. Unfortunately, failing to balance capacity and projected demand can be seriously detrimental to your bottom line. If you set capacity too low (and so produce less than you should), you won't be able to meet demand, and you'll lose sales and customers. If you set capacity too high (and turn out more units than you should), you'll waste resources and inflate operating costs.

KEY TAKEAWAYS

- The job of **operations management** is to oversee the process of transforming resources into goods and services.
- The role of operations managers in the manufacturing sector includes production planning, production control, and quality control.
- During production planning, managers determine how goods will be produced (production process), where production will take place (site selection), and how manufacturing facilities will be laid out (layout planning).
- In selecting the appropriate production process, managers compare three basic methods: **make-to-order strategy** (goods are made to customer specifications), **mass production** or **make-to-stock strategy** (high volumes of goods are made and held in inventory for later sale), and **mass customization** (high volumes of customized goods are made).
- In choosing the site for a company's manufacturing operations, managers look for locations that minimize shipping costs, have an ample supply of skilled workers, provide a favorable community for workers and their families, offer resources at low cost, and have a favorable business climate.
- Managers estimate the quantity of products to be produced by forecasting demand for their product and then calculating the capacity requirements of the production facility—the maximum number of goods that it can produce over a given period under normal working conditions.

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered in this section. This short quiz does **not** count toward your grade in the class, and you can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

1. Jetboard, (accessed October 19, 2011); [Liquid Blue Features PowerSki Jetboards](#), YouTube video, 6:50, posted by “powerskijetboard,” March 13, 2008, (accessed November 1, 2011); Jetboard, “[Publicity](#),” (accessed November 1, 2011). ↩
2. Cliff Gromer, “PowerSki Jetboard,” *Popular Mechanics*, March 2000, (accessed June 1, 2008). ↩
3. See these websites for examples of customized products: [Nike](#), [Levi](#), Oakley, and [Mars's M&M's](#) (accessed November 2, 2011). ↩
4. Anita Windisman, “*Personalized Packaging: Kleenex Offers Customizable Tissue Boxes*,” One of a Kind Publishing, Inc., January 3, 2008, (accessed November 1, 2011).) ↩

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