

Chapter 1

An Introduction to Operations Management

Why is it important to study operations management and the operations management chain as part of a business education? Regardless of what business activity you may find yourself associated with in the future, there will be an operations management chain supporting it in some fashion. Not only is it important to study operations management as part of your business studies, it is equally important to study current operations management practices to remain current and to identify positive and negative trends in business operations to ensure that your business remains current and competitive in today's changing business environments. For example, the Hawaiian sugar industry continued to do operations the same way for decades and found themselves to be outdated and no longer competitive resulting in the closure of the Maui Sugar Company operations in 2016. The Maui Sugar Company processing facility is shown in figure 1.1.

Another example of not remaining current is Sears. Sears was the largest brick and mortar retailer for over a century and as late as the late 1990s over 75% of American households had at least one Kenmore appliance in the house. Today Sears is almost gone and stores are being closed almost daily as shown in Figure 1.2 of the old Sears in Leavenworth, Kansas.



Figure 1.1: Maui Sugar Company Operations, May 2016, shortly before closing all operations



Figure 1.2 Former Sears Building in Leavenworth, Kansas

What is operations management?

Operations management is the core of almost every business. Operations management includes all of the planning, design, production, sourcing, supply chain operations, customer service, and even the return of products that do not meet the needs of the customers. APICS¹ defines operations management as “1) The planning, scheduling, and control of the activities that transform inputs into finished goods and services. 2) A field of study that focuses on the effective planning, scheduling, use and control of a manufacturing or service organization through the study of concepts from design engineering, industrial engineering, management information systems, quality management, production management, inventory management, accounting and other functions as they affect the operation.”² It is really the second part of the APICS definition that we will look at in this textbook.

It may be easier to ask, what is not operations management? From a purely academic perspective, almost anything can be classified as part of operations. From a strictly distribution and manufacturing viewpoint, everything could be considered part of operations management. From a services perspective, everything fits under operations management.

Operations management terms, principles, and techniques are consistent across all spectrums of business—regardless of whether the business is a for-profit business, a not-for-profit business, or a service industry. We will look at the principles of operations from the manufacturing and services perspectives. Inherent to the study of operations management are the

¹ APICS is part of the Association for Supply Chain Management (ASCM). ASCM is the largest supply chain management professional organization in the world.

² APICS online dictionary app: operations management

basics of supply chain management. Without supply chain management, no operation can be successful as some of the “dot.com” companies discovered in the late 1990s. Some of these companies designed great Web sites but overlooked the need to have a great supply chain to deliver the products advertised on the Web sites. This contributed to the “Dot.com bust.”

Why should you care about operations management as a student? Operations management is the foundation of all business operations. Regardless of your major, without the tactics, techniques and procedures associated with operations management a company cannot be successful. The foundation established by this study of operations management will assist you in your study of business and the principles of operations management are transferable to other areas of studies even outside the study of business. Some of the techniques covered in this textbook can be applied to work, study, and your personal life. The goal of this course is for you to understand how operations and supply chain management relate to your particular major.

Why is operations management important in business? All businesses need operations management or at least most of the topics covered in this text to be successful. Organizations exist to meet the needs of societies that people working by themselves could not produce. In order to do this, the companies must master the tactics, techniques, and procedures of operations management discussed in detail in this textbook. The tactics, techniques, and procedures of operations management are not like a menu in a restaurant or an optional list of topics that owners of companies can choose some of and ignore the others. All of the topics discussed in this textbook as part of the operations management chain work together to create the synergy necessary to meet the needs of society and make a profit if the company is a for-profit organization.

Most businesses operate for two reasons 1. The primary reason is to make a profit and 2. The secondary reason for many companies is to put the competitors out of business. Some companies will state in their brochures that they are in business to provide a certain good or service, but the real reason people go into business is to make a profit. Few individuals go into business to lose money unless they are already rich and need a tax shelter to compensate for other income streams. Some professional sports teams appear to fit into that category, the owners are not really concerned with winning or making a profit but just seem to want to show losses to counter other income. Most companies are in business to make money and hopefully put the competition out of business. Any for-profit company that claims to be in business for any other reason is not being honest with the customer or with themselves.

I am sure that Walmart was not started to put other companies out of business but look at what happens to small “Mom and Pop” stores when a Walmart moves into an area. The same is true with The Home Depot and small hardware stores. I am pretty sure the goal of Amazon is to put everyone out of business and be the monopoly that controls everything. Just look at their growth into cloud computing services, ground transportation, every possible product, air transportation and sea transportation.

Companies provide goods and services for a reason—they are in business to make a profit. The only way that a company can make a profit is to focus on the basics of operations management. Some companies are successful without focusing on the basics of operations management but those are the exceptions to the rules.

A systems approach to operations management looks at the entire system from the beginning to the end. Supply chain management now looks at the supply chain as extending from the supplier’s supplier to the customer’s customer. Here it is important to introduce a new

concept: an operations management chain. An operations management chain connects the inputs such as raw materials through the transformation processes at various levels all the way through to providing a good or service to a customer and continues through the life cycle of the product or service. This includes the life cycle management of the product, the design of the product or service, the manufacture of the product, the delivery of the service and if necessary, the return or reverse supply chain and the ultimate disposal of the product if necessary. As you can see, the operations management chain is like the supply chain and the two concepts are intertwined and will be addressed in this text. This text looks at operations management from a systems approach to operations management.

Dr. W. Edwards Deming left the US and went to Japan in the 1940s after World War 2 to help the Japanese rebuild their economy and to teach them statistical quality control and the foundations of what we call Just in Time today. Dr. Deming once stated, “If you cannot describe what you are doing as a system, you do not know what you are doing.” The economic meltdown of 2008-2009 showed the world that a lot of companies did not know what they were doing. The pandemic of 2020 has revealed the same thing. Some of the problems that surfaced during those economic crises were the results of decisions made decades earlier. The demise of Sears, the closings of many Macy’s Stores, and the 2020 bankruptcy filing by JC Penney are a good example of an economic crisis revealing flaws in previous decisions. Some of the problems were the result of the focus on the short term bottom line with no regard for the long term and some of the problems were an example of Darrow’s Survival of the Fittest.

Businesses operate in a cycle—failure to plan for survival during the next business cycle may very well result in severe problems when the cycle appears. Operations Management and Supply Chain Management require a total system approach and a long-term focus in order to be

successful. The goal of this study of the operations management chain is to assist the student in being able to describe what they are doing as a system and to see operations management from a systems approach.

A system can be defined as a group of interrelated items, events, or actions. Here are some examples of systems:

- Going to class—watching the videos - reading the assigned materials – staying awake in class - doing the homework problems - studying for exams - passing exams - passing classes – graduating – getting a good job. Figure 1.3 shows these actions as a system.

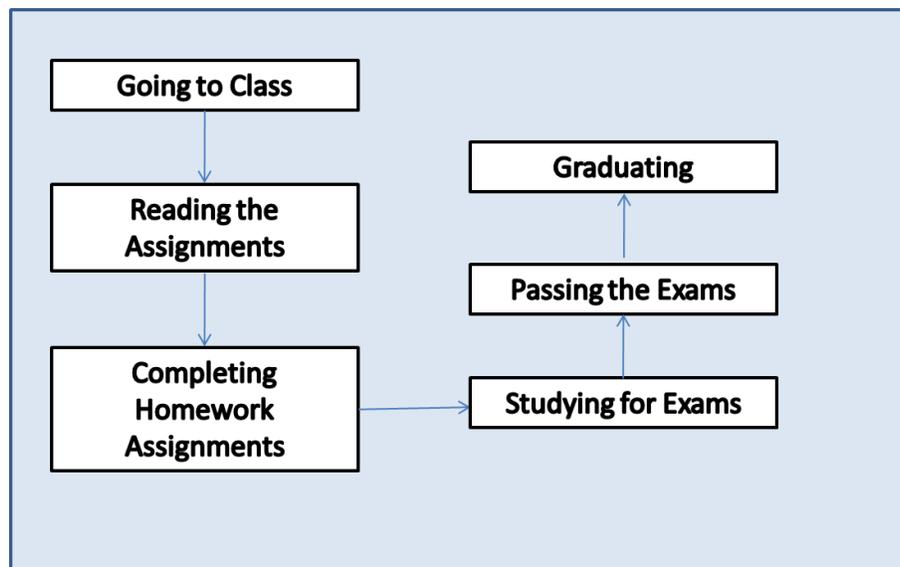


Figure 1.3: Example of a System of Interrelated Events

- Sports: Conditioning – Practice - watching game films - adjusting the game plan - practicing the plan - win games.

Inputs to the Operations Management System Approach

Regardless of the industry that you are working in, operations management is the core process that determines the effectiveness of the business and the profitability of the company. Operations management can be described as a system that includes the inputs, a transformation process and outputs usually in the form of a good or service. Figure 1.4 shows the operations management chain as a system. Critical to this system are the feedback loops between each of the three components of the system.

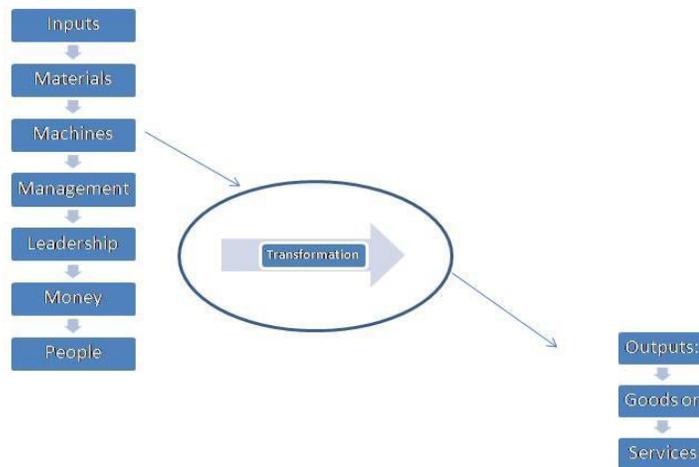


Figure 1.4: The Operations Management System

The inputs to the operations system include:

- **Materials** – the materials inputted into the operations management chain are raw materials, components, assemblies, or other parts. These materials will be transformed into final products, other assemblies, or components that will be transformed in another link of the operations management chain into another completed product or used to provide a service.
- **Machines** – although the machines are the products of another transformation process that converted raw materials, parts and components, machines are inputs into the transformation of other materials, assemblies or components into products. Machines as inputs to the operations management transformation process is an example of the Operations Management Chain. No product or service is produced in a vacuum. The Operations Management Chain may be extended through several links from materials to machines to components to machines to final product and then tied into the Supply Chain to get the product or service in the hands of the final customer.

There is a link between the machines and the materials. No matter how good a machine is, the machine cannot produce a quality product without quality materials.

- **People** – unlike materials and machines and other inputs to the Operations Management Chain, labor is not a commodity that can be moved and managed. People must be led not managed (we will discuss this in greater detail in subsequent chapters). People are a major link in the Operations Management Chain. People are necessary to run machines, procure products and materials, maintain machines and systems, move materials, and move final products through the supply chain to the ultimate customer—which is another people link in the Operations Management Chain. The move to automate systems and

remove people from the manufacturing chain at General Motors in the 1980s led to serious problems and placed General Motors on the *Supply Chain Digest* list of the Worst Supply Chain Disasters of All Time.

There is a link in the operations management chain between people and machines. The best machine in the world will have trouble producing a quality product if the operators of the machine do not know how to operate it. And even the best people in an organization need quality managers and leaders to reach new levels of excellence in the production of goods or providing quality services.

- **Management** – someone must manage the system. Without management systems can get out of tolerance easily. With management systems may also get out of tolerance and produce less than quality products. A manager may very well make the difference between a good operation and a mediocre operation. Moving from a line worker to a manager is a big step in a career and does not happen without education and training on how to be a manager. We will look at the Theory of Constraints throughout this study of operations management and the operations management chain. Too often, the constraint on an operations management chain is the training and experience of the manager or management and their policies. One of the goals of this study of operations management is to assist the student in identifying systems and operations management chain constraints and how to improve the systems by removing the constraints—even if the constraint is the management.

Every transformation link in the operations management chain needs managers to ensure that operations work properly. This is the link between people, machines, and products quality. The next input in the operations management chain is leadership.

- **Leadership** – all too often used interchangeably with management, there is a distinct difference. The simple dichotomy was explained by a Reserve Officer Training Corps (ROTC) instructor at North Carolina State University early in my college days. He explained to us, “You manage things and you lead people.” All too often, leaders believe that they lead organizations. In fact, leaders lead the people that make up the organization. Just as a good manager can make a difference in an operation, a good leader will be the difference between a good and a great organization. A mediocre organization will not attract quality people; without quality people to work on the machines there will not be quality products no matter how well the managers try to manage the system. Without quality products, companies will not remain in business too long.

Just as moving from the line to management is a big step, so is the move from management to leadership. Just because a person is a good worker on the line does not ensure that without additional skills training that person will be a good manager. The same is true for leadership. Not everyone can be a leader, not everyone even wants to be a leader. A good manager does not automatically become a good leader. There are skills necessary for leaders that are not inherent in every manager. These skills can be taught but all too often companies assume that a good manager equals a good leader.

Business schools teach business management. Leadership on the other hand must be modeled, not taught. To have a quality company, the company must have a leadership development program to develop leaders that can lead the people and managers of the organization. Leadership is learned by watching other leaders in action and from experience.

- **Money** – without money as an input to the operations management chain, there is no chain. Why, because if no one is buying anything, then no one is selling anything. If no one is buying or selling, there are no materials, components, or parts to make the products or provide the service. If no one is buying or selling, there is no money to hire quality managers, leaders, or workers. With no workers, nothing is produced. And if there is no money, no one is purchasing services from the operations management chain.

Operations Management Chain Transformation Processes

What types of transformation takes place in the operations management chain? Figure 1.5 provides examples of the transformation processes that take place in the operations management chain.

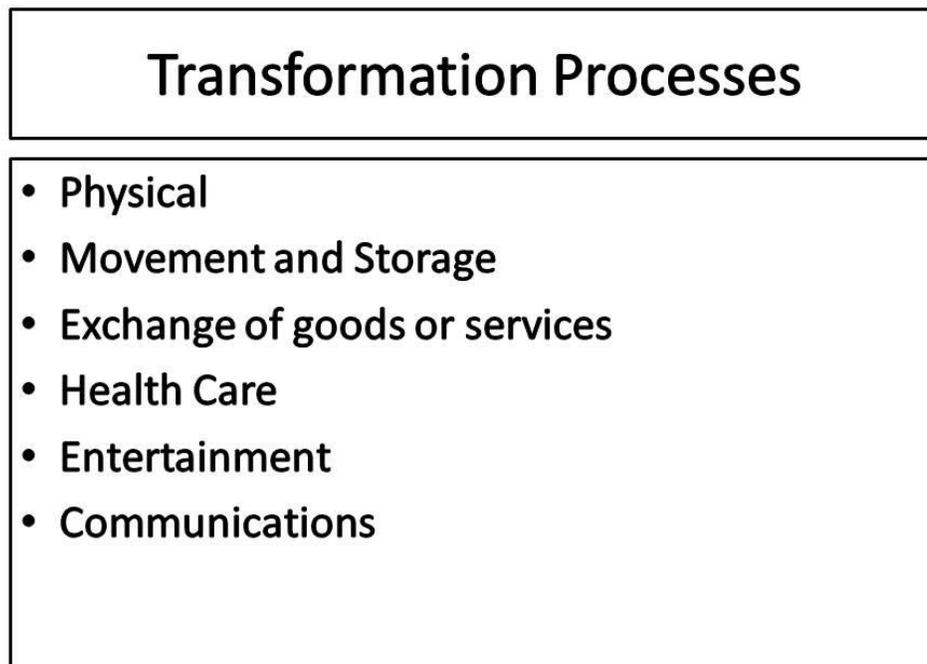


Figure 1.5: Transformation Processes

- **Physical** – A physical transformation is seen in manufacturing where the raw material input is transformed into a finished product. This form of transformation is the most discussed transformation process in Operations Management. Another example of a physical transformation can be seen in building a house as the materials are transformed from a collection of inputs into a finished house. Dell conducts a physical transformation from subassemblies into a finished computer.
- **Movement/Storage** – Moving the product from one point to another in the supply chain is distribution. If the goods are moved, (it could be a move of 1 inch) the transformation process is the movement of the goods; if the goods are moved and then stored, the transformation process is the storage of the goods until another move transformation takes place.
- **An actual exchange of goods** – In retail operations there is a transformation that includes the input of a customer with cash or credit and the input of a retailer with a good or service. The transformation is the exchange of the good or service for the cash or credit. The output of the process is the customer with the new product or service and a retailer with the capability to procure more goods to sell to another customer. This in turn stimulates the physical processes of the manufacturing transformations. This same exchange process may take place between a wholesaler and a retailer or the distributor and the retailer.
- **Physiological** – A physiological transformation has the input of a sick patient; a transformation process that includes the appointment with a health care provider and perhaps the use of a medication and advice from the doctor. The output of this system hopefully is a well patient.

- Entertainment as a transformation** – Assuming that entertainment may be a transformation in an operations management, the inputs would be customers needing some form of entertainment and the payment for that entertainment; the transformation is the entertainment (good or bad); and the outputs of this transformation would be customers that are either happy with the process or unhappy with the transformation. The output is dependent on the quality of the transformation process.
- Communications Transformation** – Effective communications require a very good transformation process to be effective. The inputs are the messages or words from one source; the transformation is the understanding of the message; and the output may very well be the actions taken as a result of the transformation and understanding.
- There may be more than one transformation process in the Operations Management Chain as shown in Figure 1.6.

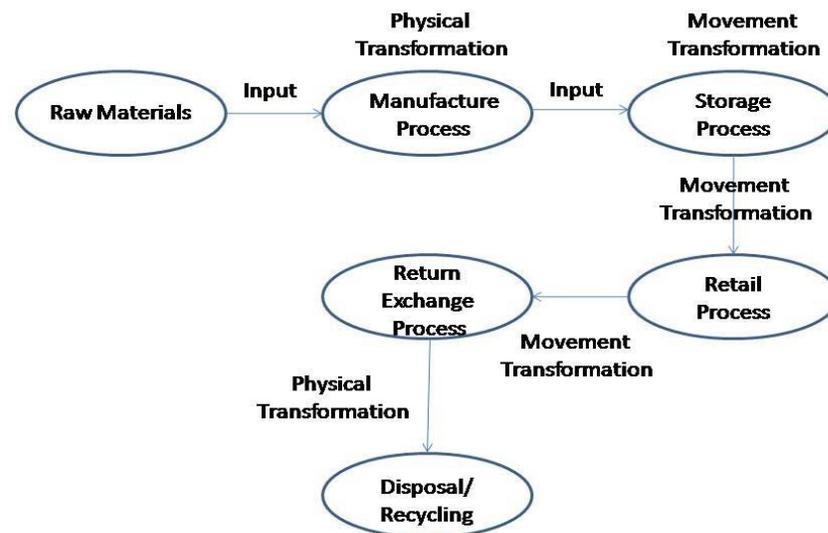


Figure 1.6: Example of Multiple Transformations in the Operations Management Chain

Topics in Operations Management

Decision Making. Operations management involves decision making which will be discussed in greater detail in another chapter. Decision making provides a competitive advantage.

Customer Service. Is customer service important to the operations management chain? Should customer service be a part of the study of operations management? Is customer service a product/ an output/ an input/a transformation process? An argument could be made for each—we will take a detailed look at each from an operations management chain perspective.

During our look at operations management, we will look at the differences between products and services as we look at the product/service design processes. This discussion will look at forecasting and why forecasting for services is a little more difficult than forecasting for products.

The quality of a product is determined by the customer. The quality of a service is very similar. Strength, durability, and performance are examples of attributes of services—this includes the length of repair time, the quality of repairs, and the ease of repairs. These attributes are just some of the factors that separate services operations management from manufacturing operations.

The study of operations management will look at the design of a product or service and the need to design quality into the product or service vice trying to inspect it in later. Management and leadership of the company not only should be part of the design process but must be involved if the launch of the product or service is going to be successful. A company's strategy should drive the product development, the service development, and the competitiveness of the company or country. We will look at strategy and competitiveness in the next chapter.

All operations add cost to a product or service but not all operations add value to a product or service. Operations Managers are responsible for determining which processes or operations add value and which ones are non-value-adding. If a process does not add value to the bottom-line profits, the experience of the customer or the quality of the product then there is no value added. Our look at process and product design will discuss the methods for identifying value added and non-value-added processes and how to improve the operations management chain by eliminating non-value-added processes.

Impacts on Operations Management:

To fully understand the basics of operations management, it is necessary to look at the impacts on operations management from history.

- In middle school and high school most of us studied the **Industrial Revolution**. In Middle School we looked at the impact of the Industrial Revolution on the manufacturing of goods and the start of the transformation from an agrarian society to a manufacturing society. The impact on manufacturing impacted the thoughts on operations management even though the concept of operations management was not conceived. The impacts on operations management from this period of time included:
 - James Watt and the invention of the Steam engine in 1769. As every school kid learns in grade school, this had an extreme impact on the building of products and how products were produced.
 - In 1776, while the Colonies that later became the United States were discussing a break from England and were drafting the Declaration of Independence, Adam Smith was studying the concept of the **division of labor** in manufacturing. His research and theories are still taught in business schools today.

- History is taught differently in different countries and even in different parts of the country. School children in the Southern United States, especially, learn about the impact to the growing, processing, and sorting of cotton seeds from the cotton from the invention of the Cotton Gin by Eli Whitney. The cotton gin allowed plantation owners to process more cotton as this invention quickly separated the cotton ball from the cotton seed. What is not taught is the fact that Eli Whitney is also the father of interchangeable parts in manufacturing. In the 1790s, Eli Whitney received a US Government contract to manufacture muskets for the Army. As is typical with many government contracts even today, he got behind schedule on his contract. He was later called in to see the President to explain why he was behind in delivering the weapons to the Army. Whitney took a weapon to the meeting with the President. Whitney explained to the President that he was developing a system where the parts of the muskets could be interchanged between weapons. Prior to this, if a musket part broke, the weapon was useless and worthless. With the advent of the **interchangeable parts** as designed by Whitney, the muskets he was making could be repaired without losing the weapon completely. In a modern day analogy, without interchangeable parts if the light bulb in your lap blew out you would have to get a new lamp rather than replacing the bulb. Figure 1.7 is a replica of the muskets that Eli Whitney was working on.



Figure 1.7 Replica of Eli Whitney Musket

- **Scientific Management** focused on the way items were made and the people that made the products. The impacts on Operations Management from Scientific Management include:
 - Frederick W. Taylor came up with the principles of Scientific Management and the analysis of workflows in the later part of the nineteenth century and became popular in the early twentieth century. These same principles are still in use today. In fact, the works of Taylor focused on gaining efficiency and reducing waste—not unlike the lean and Six Sigma movements of the late twentieth century.
 - In 1912, Henry Gantt invented the activity scheduling chart that bears his name and is still in use in program and project management today as will be discussed in more detail in the discussion on program and project management. Gantt charts, simple to use bar charts for program management, were used in projects such as building the Hoover Dam.
 - In 1913, Henry Ford designed the moving assembly line at his Rouge River Plant. The basics of the assembly line can be seen in today’s automobile and motorcycle assembly plants. Henry Ford gets credit for designing the assembly that is not indifferent from the lines used by automobile manufacturers today. In addition to the assembly line, Ford is also the father of the modern day Reduce, Reuse, Recycle concepts. He was “green” long before political leaders started pushing the “green” movement and long before being green was politically correct. Ford had his suppliers deliver parts to the plant in wooden boxes that were specially designed with holes in the boxes in specific places. The suppliers could not figure

out why the holes were in specific places. Seems Ford was using the sides of the wooden boxes as the floorboards of the cars.

- In addition, Ford was known for saying “you can have it in any color you want as long as it is black.” It wasn’t that he was that fond of black paint; it was because through research he knew that the black paint cured faster than other colors thus prompting his demands that the Model A stay black even when other colors were available.
- **Human Relations** or the lack thereof. Human relations/human resources should be the office and activities that allow companies to find the right personnel—however, somewhere along the line the human part of the human relations equation got changed. Instead of trying to fill the right person in the right slot somewhere along the line, in a lot of companies, the concept became “let’s fill the slot with the right resume” regardless of the real qualifications. If an applicant does not have the right “buzz words” in the resume, the applicant does not even become a candidate regardless of how qualified that person may be. The advent of the computer age coupled with the advent of the Internet has allowed companies to de-personalize the human aspect of human relations/human resources. The human resources concept has encouraged human resources managers to use management theories and practices to manage people like any other commodity.
 - The US Army moved away from local personnel offices at every installation to regional hiring offices in the name of efficiency and cost savings. The result was a decline in the human aspect of human resources and a loss of local advisors for hiring officials. This led to a lack of confidence in the human resources process.

- Another example of the loss of the human factor in operations management came a couple of years ago when a company advertised for a supply chain manager and then after a plethora of resumes were received, the company called and asked what skills they should look for in a supply chain manager. This was a question that probably should have been asked prior to the advertisement of the job.
- Another example came when I was talking to a Human Resources conference. I was informed by the Vice President of Human Resources of a major company that they “did not have time to focus on the people as they were focused on profits.” This was in response to a comment that a focus on hiring, training, and retaining the right people is critical to a successful operation and a measure of the leadership of the company. Later in the discussion, it came out that this particular company was having trouble retaining people because the company was in bankruptcy. My suggestion was that perhaps since the company was focusing on profits rather than people and was in bankruptcy; perhaps the time was now to start focusing on people as the current focus was not working.
- Part of the Human Resources focus on Operations Management includes looking at how employees are treated and compensated. This includes answering or at least looking at the question: does employee ownership impact operations? Southwest is a good example of employee ownership. In the Kansas City area Hy-Vee is an employee-owned grocery store that prides itself in the pride of ownership and the service provided by the employees. The Publix grocery store chain has survived and thrived for the same reason – the employees are also the owners and care about customer satisfaction.

- Human resources management includes not only what employees are hired, how the employees are trained but also how the employees are treated while employed by the company. This goes a long way in keeping quality employees at a company and not only builds employee pride but also prevents having to use time and money to train new employees constantly. In the late 1990s there was a distribution center in West Memphis, Arkansas that experienced a 95% employee turnover rate – they were constantly hiring and training new employees.
- From 1927 - 1932, Elton Mayo conducted his famous Hawthorne studies at the Western Electric Hawthorne Works. During this series of motivational studies, lights at the Hawthorne plant were turned up and production went up—assumed to be linked to the increase in lighting; then the lights were turned down and productivity went up. As it turns out the improvements in productivity and motivation were tied to the employees feeling like someone was concerned about them and had nothing to do with the brightness of the lights.
- Abraham Maslow established hierarchy of needs in the 1940s and published his findings in a paper titled “A Theory of Human Motivation” in 1943. Maslow’s hierarchy of needs is still taught in business schools over seventy years later and is considered in hiring actions in major companies. One company that I interviewed with was so focused on meeting basic needs that they overlooked the need for self-esteem and self-actualization.
- Frederick Herzberg and Douglas McGregor developed their motivational theories through studies and research in the 1950/1960s. Herzberg looked at the factors that caused satisfaction and dissatisfaction at work. McGregor published his book,

The Human Side of Enterprise, in 1960. His Theory X and Theory Y views of motivation were detailed in this publication. McGregor's theories assumed that workers are inherently lazy and need to be motivated or were inherently motivated and did not need a lot of external motivation to get them to work. Dr. William Ouchi later came along with his Theory Z approach stating that workers do not neatly fit into one category or the other but actually may fit into both categories. This meant that there was no one size fits all HR approach.

- Perhaps the goal of human resources management should be akin to the thoughts of Jim Collins in his book *Good to Great*. HR needs to focus on getting the right people in the right seats on the bus. In other words, getting the right employees in the right jobs in order to be successful in operations.
- **Management Science** or the study of management as a science has enabled companies to focus their efforts on improving management of resources and operations. Some of the impacts on the management of operations from Management Science include:
 - Linear programming was developed in 1947 by George Dantzig. Linear programming can be accomplished through specialty programs or on Excel today. Because of its applications to manufacturing and scheduling of resources it is still in use to maximize production of products and product mixes and to maximize customer satisfaction and/or profitability.
 - The development of the first digital computer by Remington Rand in 1951 led to a whole new way of managing and later a new way of communicating and sourcing. What an impact this had on the management of the operations. Try to imagine daily life without the use of smartphones or computers.

- Operations research/systems analysis was evident in our earlier example of Henry Ford and the curing process for black paint. With the use of simulations to determine the impacts of systems and decision before implementation, cost avoidance and systems miscues can be minimized. DuPont and the US Navy developed the techniques of the **Critical Path Method (CPM)** and the **Program Evaluation and Review Technique (PERT)** that will be discussed in greater detail in the discussion on Project Management.
- Joseph Orlicky working for Oliver Wight developed a simple technique for material planning and time phased ordering known as **Material Requirements Planning** in the 1960s. When originally designed the MRP system was simple because most companies were manufacturing only a few products. As companies implemented automation and increased their product lines the MRP programs became more complicated and now MRP is seen as the precursor to modern day Enterprise Resource Planning programs widely used today. We will look at this in more detail later in the course.
- **Quality.** The **Quality Emphasis** movement has had great impacts on the management of the operations management chain. This will be discussed in greater detail in a separate chapter. The focus on quality adds a whole new perspective to the management of operations. The focus and emphasis on quality has forced companies to change their focus from producing products to producing quality products. Some of the impacts on the quality emphasis movement that will be discussed in greater detail include:
 - **Lean/Just-In-Time.** The JIT movement was originally thought to be another great Japanese import in the 1970s. Shigeo Shingo and Taiichi Ohno developed

the Toyota Production System based on lessons learned from Dr. W. Edwards Deming. This concept is often misunderstood. We will address both Lean and Just-in-Time in a later chapter.

- **Reengineering** emerged in the 1990s as a result of the books by Hammer and Champy. Their series of books prompted companies to look at reengineering the company and management. Unfortunately, for most of the companies that undertook reengineering (approximately 70% of all reengineering projects) failed. Most of these programs failed due to a lack of leader involvement. In 2009, they released an update on Reengineering that revealed that they had ignored a small part of the corporation. That small part was the people aspect. This ties back to our discussion of human resources.
- **Information Age/Internet Revolution** – Al Gore claimed during the 2000 Presidential Election that he “invented the Internet.” And we all know that a politician would never lie to us. This invention was an expansion of previous research and with the availability of the internet to everyone, great strides have been made in operations management. Today it is hard to imagine a world without the internet. But it was not until the mid-1980s that this was available to the general public and it was the mid-1990s that most people finally got access and their own e-mail addresses. The availability of information and the ability to pass this information to almost anybody has impacted the management of operations while at the same time it has created a new set of problems for information security. Globalization and the Internet Age coupled with the Information Revolution provided a number of impacts to operations management, the biggest impact was the advent of electronic commerce or e-commerce.

- **E-commerce** provided operations management with new forms of businesses. These include business to business (B2B); Business to Consumer (B2C) such as consumers buying directly from a company from their website thus eliminating the need for a bricks and mortar operation or in conjunction with the bricks and mortar operation; Consumer to Business (C2B) as in a reverse auction site; and Consumer to Consumer (C2C). E-bay was originally designed to be a C2C business but has morphed over time to be both a C2C and a B2C as more companies are using E-bay to sell overstock and refurbished items.
- **Globalization of Supply Chains.** Just as the advent of the Internet impacted operations management, it also impacted the management of supply chains. With the Internet, companies can source from Asia, build in the States and sell to customers in Europe without ever speaking face to face with the supplier or the customer. Just as the Information Age added the problem of information security, the globalization of supply chains has added a whole new problem in the area of supply chain security. The problems associated with supply chain security will be discussed in a separate chapter.
- **E-commerce explosion.** With the growth of Amazon, the explosion of e-commerce continues to impact operations. The pandemic of 2020 has helped to continue the fueling of e-commerce as people continue to turn to safer ways to shop.
- **Internet of Things.** The internet of things comprises all of the devices connected to the internet from my coffee pot to my phone to my watch. Think of all the devices that you use every day that are connected to the internet.

- **Blockchain.** The latest development to impact supply chain management is blockchain. Developed originally to track the flow of bitcoin, blockchain offers the supply chain a digital ledger or chain of custody for products to pinpoint who did what, when it was done and identify issues in the supply chain.

Operations Management as a discipline

The operations management includes the product design process which will be discussed in detail in another chapter. A good design process includes not only the product design but also the process design or how the product will be made. Whereas the process design describes how a product will be made; the product design includes:

- Designing a product or service for a specific purpose—although sometimes the design for a specific purpose does not always end up with the product and purpose originally intended. Viagra was originally designed to be a product for high blood pressure but has obviously been more successful for other purposes.

The post-it note was a by-product of an attempt to develop a new glue and a way for one of the designers to mark pages in his hymnal. Obviously, that mistake was a very profitable one for 3M. The product minoxidil was not originally designed to help grow hair, but a world class powerlifter and amateur chemist named Tony Fitton noticed the side effect of the drug and used the product to help balding males to grow hair.

- The design process sometimes includes the planned obsolescence of the product. Not a popular technique but it is used by computer designers and many other electronics product designers. The design process within operations management must include answering the question— “What should the product look like?”

- The design process has to also answer the question— “What should this product do?”

The answer to this question should come from the needs of the customer and should come from the first step of Six Sigma according to Motorola. In an introductory course on Six Sigma at Motorola University, students are taught that the first step of Six Sigma has to focus on the customer and should answer three basic questions:

- Define who the customer is.
 - Define what the customer wants.
 - Define how we do it better than the competition.
- What additional options and optional features should the product have? This is another question that the design process should answer. While deciding what new products to design and produce, companies also have to decide what products need to be improved and what products need to be phased out of production based on the product life cycle.

Sometimes some companies discover that some products are better off not being altered.

Companies such as Waffle House³ (as shown in figure 1.8) and In-N-Out Burger⁴ have

³ The simplicity of Waffle House can be seen in their visible food preparation operations that are on display for all customers to see while waiting for their food.

⁴ The In-N-Out Burger chain was formed in 1948 in California. In-N-Out was the first drive in hamburger store and the first restaurant to use two way communications to order food at the drive in. The menu of In-N-Out has not changed since its inception and the process of fresh ground beef, fresh cut potatoes and fresh bread and vegetables has not changed since the first restaurant was opened by the Snyder family in 1948. Because of the link with the growth of the freeway system and the fresh products has contributed to contributing to the In-N-Out chain becoming almost a cult like following and customer loyalty. In-N-Out will only expand into areas that can be supported from their corporate owned and operated meat processing plants.

opted to keep the simple products simple. In-N-Out prides themselves on their simple menu. Keeping operations and options simple is not always a bad decision as the success of these companies show.



Figure 1.8: Simplistic Restaurant Food Preparation Area of Waffle House

Operations Management and Free Trade

Do free trade agreements really help promote more trade? This was the promise of the North American Free Trade Agreement (NAFTA). This promise was not as successful as promised as evident by the lack of “free” movement across the US–Mexico border for Mexican-based truckers. As a result, the United States-Mexico-Canada Agreement (USMCA) was signed in November 2018 (go to: <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement> for more information of this agreement).

The Free Trade Agreement created by the formation of the European Union has been much more successful. Although the viability of that agreement will be tested when the exit from

the EU by Great Britain (Brexit) is completed. The Free Trade Zones within the United States have provided a form of improvement in the operations management chain by allowing products to come into the US FTZs, assembled into products and then shipped out without paying tariffs. The Free Trade Zone Colon in Panama is a classic example of the operations of a FTZ. The Colon Free Trade Zone (Zona Libre, Colon) is organized into two basic areas. The storage or distribution center area supports the “retail” area that allows companies from all over the globe to have store fronts for arranging shipments of products from Colon to the respective company’s facilities without having to pay customs or duties on the products. Figure 1.9 shows the retail area of the Free Trade Zone Colon. Figure 1.10 shows another FTZ in Panama based out of the old Howard Air Force Base, now known as Panama Pacifico.



Figure 1.9 Inside the Retail Area of FTZ Colon



Figure 1.10 Diorama of the Panama Pacific FTZ

Globalization and Competitive Companies

“With the storehouse of skills and knowledge contained in it millions of unemployed, and with the even more appalling underuse, misuse, and abuse of skills and knowledge in the army of employed people in all ranks of industries, the United States may be today the most underdeveloped nation in the world.”

- W. Edwards Deming, *Out of the Crisis*, 1982

The globalization of corporations has impacted operations management while lengthening the operations management chain. Corporations have expanded globally in order to compete with other corporations globally.

Some corporations chose to expand globally in order to cut costs. At least the stated objective of offshoring operations and expanding globally was to cut costs and control more of the operations management chain and the supply chain from sourcing to manufacturing and to manufacture in a lower cost country. This has not always been the result. In some cases, the expansion has actually cost the companies more in transportation and supply chain inventory costs so that the expansion goals of cost cutting were not met. As we recover from the COVID-

19 Pandemic it will be interesting to see if companies reduce their reliance on foreign manufacturing and return to domestic operations.

Some companies have expanded globally in order to enter new markets. As we will see in the next chapter this has to be part of the overall corporate strategy and has to be researched carefully. [Wal-Mart \(see www.walmart.com\)](http://www.walmart.com) used this technique to expand into Germany. Germany had a discount chain that somewhat resembled a Wal-Mart SuperCenter known as Wertkauf. Wertkauf carried almost all of the things you would find at a Wal-Mart SuperCenter to include clothes, food, household goods, and recreational equipment. During my tour in Germany, this was one of my favorite local stores for shopping. Wal-Mart wanted to expand into Germany and saw Wertkauf as a logical expansion opportunity. The Wal-Mart culture and the German mindset did not mix leaving Wal-Mart with a failed expansion attempt and leaving Germany without Wertkauf.

To compete with local companies, it may be necessary to expand globally as Wal-Mart attempted to do in Germany and as Wal-Mart has done rather successfully in Mexico and China. In other cases, the only way to get into a market is to establish a “local” operation. In other cases, it may become necessary to compete globally to expand out of a corporation’s home country. The Home Depot announced in 2012 the closing of their stores in China as a result of not fully understanding the market and the culture.

In the updated version of the 2007 Best Seller, *The World is Flat*; Milton Friedman looked at the globalization of companies and their supply and operations management chains that have become flattened by the globalization of operations. Friedman also discussed the outsourcing and offshoring of operations to other countries to take advantage of the resources of

the countries. Friedman's book is a detailed discussion of the globalization of companies, their operations, and their supply chains.

The Operations Management/Supply Chain Management Star

Several years ago, I developed what I call the Operations Management/Supply Chain Management Star to show the interrelations between these topics and the other business disciplines. The purpose of the star is to link all of the business disciplines together to enable you to see that operations and supply chain management cannot be accomplished without the other business disciplines and if you moved one of those into the center you could make the same argument for that discipline as well. The star is shown in Figure 1.11.



Figure 1.11 The Operations and Supply Chain Management Star

Summary

Operations Management is a complex subject that has impacts on every aspect of a business. A systemic approach to operations management looks at the inputs, the transformation

processes, and the outputs of an operation management chain. Operations management does not operate in a blind or a vacuum. Operations Management is a system of interrelated processes that include sourcing, manufacturing, distributing, and consuming products and services. This textbook and course will look at the processes and links that make up operations management and supply chain management.

Thinking and Discussion Questions for Chapter 1

1. How does the Department of Labor define services and products?
<http://www.dol.gov>
2. What are the differences between goods and services?
3. What are the inputs to the operations management chain?
4. Discuss the operations management as a system?
5. How did the industrial revolution impact operations management?
6. Is there a difference between a purely academic approach to operations management and a practitioner's approach?
7. How does operations management relate to your major?