

## Welcome to the course

- When I talk with my colleagues about operations and supply chain management, it's clear that one of the biggest challenges we're all facing is that we just don't have enough time. We're under constant pressure to do more work, but with fewer resources. Yes, we all genuinely want to be learning new skills and implementing the latest tools, but there is so much other work to do that it's hard to keep up. Ironically, we get so busy dealing with today's problems that we miss the chance to learn about new approaches that could actually make us more efficient. My name is Daniel Stanton and I'm passionate about operations, logistics, and supply chain management. Throughout my career, I've found the work of managing operations, coordinating logistics, and driving real business value through procurement to be interesting, challenging, and rewarding. And I especially enjoy the challenge of transforming supply chains through effective project management. I define a supply chain as a complex network made up of people, processes, and technologies that is engineered and managed to deliver value to a customer. So throughout this course, we'll spend time looking at all three of those areas. I'll share tips on how to manage them effectively and how to drive improvements. My goal with this series is to make it easier for supply chain professionals, like you, to keep up to date with the latest tools and trends in our industry. Each week, I'll highlight an important supply chain topic, show you how it can be relevant for your operations, and include links to other resources. Whether you work in manufacturing, wholesale, retail, or distribution and logistics, you play an important role in the supply chain. Understanding how these concepts affect your company and your customers and suppliers will help you achieve better results and deliver more value. The business of supply chain management is evolving quickly and we all need to invest some time in our own professional development. I hope this course will make it easier for you to learn new skills and grow as a professional. I'm looking forward to taking this journey together. So thanks for joining me for this series about operations and supply chain management.

## Focus on supply chain management

- What do an iron mine in Sweden, a cargo ship registered in Panama, and your local car dealer all have in common? They're all critical parts of your personal supply chain. Your car contains 30,000 parts. Each of them came from raw materials that were processed, made into components, and transported around the world before they were assembled into a car and delivered to you. Every component had to be there when the car was assembled, so every company had to do its part in order for that supply chain to work properly. Your company is part of a supply chain, too. Actually, it's probably part of several supply chains. You see, each of your customers has their own supply chain, and you play an important role in making all of them work. If you don't deliver your products or services on time, at the right quality level, and for the right price, then your customers have a supply chain problem. There are lots of different definitions for supply chain management, but here's the one that I use. A supply chain is a complex network made up of people, processes, and technologies that is engineered and managed to deliver value to a customer. Here's the key to understanding supply chain management. Your company makes money by being one link in a long chain of goods and service that are ultimately delivering something to a customer that they're willing to pay for. If the chain works properly, every company in the chain makes money. If the chain breaks, everyone in the chain suffers. One of the simplest ways to think about a supply chain is to visualize it as three flows, money, material, and information. Money flows from your customer upstream one link at a time all the way to the raw materials suppliers. Materials flow downstream, starting from raw materials and end up as a finished product. Information flows upstream and downstream, so if you're managing the supply chain, your job is to keep those three flows moving smoothly and quickly to minimize disruptions and turbulence. Inside of your company, there are three groups that manage most of the supply chain-related activities. First, your logistics folks, then your operations folks, and of course your purchasing folks. These three functions need to synchronize their decision making around a common supply chain strategy. For example, many logistics teams focus on improving efficiency by

filling trucks and shipping containers with as much material as they can but the operations teams may be trying to implement lean manufacturing and just-in-time deliveries which means they want small, frequent shipments. Until these two groups can agree to a common strategy, they won't be able to manage their supply chain effectively. There are several different models available to help you map out, measure, and benchmark your supply chain processes. The Council of Supply Chain Management professionals, American Productivity and Quality Center, APICS, and Gartner are four organizations that can help you with tips, tools, and techniques to manage your supply chain more effectively. You can also pick up a copy of my book, Supply Chain Management for Dummies. Whether you're an iron mine in Sweden or a cargo ship out on the ocean, knowing the role that you play in your customers' supply chain and understanding what your end customers truly value is the key to making good decisions and using supply chain management to create a strategic advantage.

### Adopt strategic sourcing

- When it comes to procurement, many companies focus entirely on measuring materials' costs, in other words they simply look at the price that they pay for their ingredients, the materials that they buy, but reducing material costs can also lead to a reduction in quality, reliability, and responsiveness, and that can end up costing you more money in the long run, that's why it's important to use strategic sourcing, an approach that looks beyond just material costs and maximizes the value of procurement for your supply chain. Let's look at an example. Say your supplier's agreed to reduce their price if you'll let them switch to cheaper raw materials and a less reliable mode of transportation, of course saving money is good, but depending on your business, these changes can actually lead to an overall increase in your total costs because you'll need to do more inspections, carry more inventory, and pay to expedite the late shipments. Strategic sourcing involves having a broader perspective on procurement decisions, it can reveal ways to reduce your materials' costs but it can also help reduce risk in your supply chain and build stronger, more sustainable relationships with your key suppliers. Here

are eight specific actions that you can take to implement strategic sourcing in your company. The first is to analyze your past purchases, look for patterns and trends to help you understand your company's purchasing behavior, are you an easy customer to work with? Or is it difficult for your suppliers to support you? You could look at your forecast for future production and sales. Comparing your forecasts to historical data can help you understand what your future procurement needs will be and what challenges you're likely to face. Review your suppliers by creating scorecards that show how each supplier performs on service and quality as well as on cost. Look at whether they're charging extra fees for changes or for special requests, and make sure you give your suppliers credit for being innovative and responsive. Go looking for suppliers that can provide the products and services that you expect to buy in the future, compare their prices and capabilities to your current suppliers. Look for opportunities to outsource your processes and look at all of your outsource processes to determine whether it may be time to bring them back in-house. Segment the materials you buy based upon financial impact and risk. Look at how payment terms are impacting the working capital requirements for your supply chain. Are you wasting money by paying your suppliers too soon? Or do you need to pay suppliers sooner in order to improve your relationship? And last but not least, identify and evaluate the risks associated with each product you buy and each supplier that you buy from. My video on supply chain risk management will show you how to build a risk register, it's part of the leading projects course that you can find on this site. Procurement plays a key role in determining how a supply chain will perform. Focusing on material costs often leads to adversarial relationships and lower overall performance. By implementing strategic sourcing, you can help to ensure that you're maximizing the value that you deliver with every dollar you spend in your supply chain and that will make you a better customer and a more successful business leader.

### Avoid inventory stockouts

- Not long ago I stopped at the store to buy three things, copier paper, a calculator, and some file folders. But on the spot on the shelf that was

supposed to have the file folders it was empty, I couldn't buy them because of an inventory stockout. Stockouts are a much more serious problem than many people realize, they cost your company money and they indicate a problem with your supply chain. So let's dig into the root causes to help you avoid stockouts in your own supply chain and let's start by looking at the cost of that stockout of file folders. The store made a series of investments that will only pay off if I come in and make a purchase. They found a supplier for file folders and built a logistics infrastructure to ship folders into all of their stores. They spent money to hire associates and operators and they spent money on advertising so that I would choose to shop there. But if they have a stockout when the customer arrives they've lost that sale and since I need to go to another store to buy file folders, it might be easier to just buy the paper and the calculator there too. In other words the stockout of one item could've caused me to abandon my whole shopping cart and which store am I going to stop at next time I'm out running errands? So the stockout affected short term revenues but it also affected my perception of the brand and my long-term loyalty to the store. All of that just because there weren't any file folders available for me to buy. So what caused the stockout? It could be a demand problem. For example another customer could've bought all of the file folders or demand may have spiked because they were running a promotion and did a poor job of forecasting how much demand there would be. On the other hand, the cause could be a supply problem, there may have been a case of file folders back in the stock room that didn't make it onto the shelf. Or perhaps the store didn't order the right amount, didn't order them at the right time, or a shipment wasn't delivered on time. But even if supply and demand were in perfect balance there is a chance that something else went wrong, shrinkage, the folders may have been put on the wrong shelf or damaged by a careless shopper or even stolen. All of these problems have the effect of reducing your available inventory, so they're called shrinkage. Stockouts aren't just a challenge for retail stores, you can have stockouts in a distribution center and you can have them in an assembly line. When you run out of products you miss out on sales to your customers and you interrupt the flow of your supply chain. For more insights on preventing stockouts, check out Eddie Davilla's course Operations Management Foundations. Stockouts are expensive, when you have the right

processes in place to detect and prevent stockouts in your supply chain, you'll earn loyalty from your customers and generate higher revenues for your company.

## Become a sustainability champion

- Baseball legend Mickey Mantle once said, "If I knew I was going to live this long, "I'd have taken better care of myself." And that's pretty good way to think about the importance of environmental sustainability because the whole point of sustainability is to ensure that we can continue living on Earth for a long, long time. In this video, we'll look at how you can make your supply chain more sustainable using some basic operations management techniques. To start with, let's look at the resources that we use. Manufacturers consume raw materials and convert them into finished products, so every manufacturing supply chain stretches back to mines, and forests, and farms, and oceans. And every company consumes energy to run machines, generate heat, keep offices cool, and power computers. Both the energy and the raw materials that we use can come from two different kinds of sources. Renewable sources or nonrenewable sources. Renewable energy comes from sources like solar power, hydroelectric, geothermal, biomass, or wind power. Nonrenewable energy comes from materials that are extracted from the earth, coal, petroleum, and natural gas. These fuels are nonrenewable because once they've been used up, they're gone forever. Renewable materials come from animals, plants, trees, and microorganisms. You can renew these materials relatively quickly by growing more. Most nonrenewable materials are mined from the ground, but some are extracted from the water or the air. There are two main ways that companies measure their environmental sustainability. The first approach is to measure their consumption, how much energy and materials they consume. For example, many facilities track their monthly usage of water and electricity. The second way that companies measure sustainability is by how much waste they produce. For instance, you've probably seen reports about the amount of carbon dioxide that companies emit into the atmosphere. Those metrics for consumption and emission are things that

every supply chain operations manager should be watching because they're really just the inputs and the outputs for a process. So here's a three step approach that you can use to find ways to improve the environmental sustainability of your own supply chain. First, reduce waste. Use tools like Lean, Six Sigma, and Theory of Constraints to ensure that your operations are running as efficiently as possible. If you can't eliminate waste completely, then try to recycle the waste that's left over from your processes. Second, reduce consumption. Look for ways to provide your customers with the products and services they need, while using less materials. Designing products so that you can repair, reuse, and remanufacture them can significantly reduce the amount of raw materials needed to support your supply chain. And third, switch to renewable sources of energy and materials. Consuming renewable resources ensures that your business can continue for a long time. We've all got to share this one planet. The decisions that you make about operations, logistics, and supply chain management, can have a big impact on the condition of that planet, and the quality of life for all of us. And the great news is that becoming a sustainability champion can actually help you drive efficiency improvements throughout your entire supply chain.

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of sources. Renewable sources or nonrenewable sources. Renewable energy comes from sources like solar power, hydroelectric, geothermal, biomass, or wind power. Nonrenewable energy comes from materials that are extracted from the earth, coal, petroleum, and natural gas. These fuels are nonrenewable because once they've been used up, they're gone forever. Renewable materials come from animals, plants, trees, and microorganisms. You can renew these materials relatively quickly by growing more. Most nonrenewable materials are mined from the ground, but some are extracted from the water or the air. There are two main ways that companies measure their environmental sustainability. The first approach is to measure their consumption, how much energy and materials they consume. For example, many facilities track their monthly usage of water and electricity. The second way that companies measure sustainability is by how much waste they produce. For instance, you've probably seen reports about the amount of carbon dioxide that companies emit into the atmosphere. Those metrics for consumption and emission are things that every supply chain operations manager should be watching because they're really just the inputs and the outputs for a process. So here's a three step approach that you can use to find ways to improve the environmental sustainability of your own supply chain. First, reduce waste. Use tools like Lean, Six Sigma, and Theory of Constraints to ensure that your operations are running as efficiently as possible. If you can't eliminate waste completely, then try to recycle the waste that's left over from your processes. Second, reduce consumption. Look for ways to provide your customers with the products and services they need, while using less materials. Designing products so that you can repair, reuse, and remanufacture them can significantly reduce the amount of raw materials needed to support your supply chain. And third, switch to renewable sources of energy and materials. Consuming renewable resources ensures that your business can continue for a long time. We've all got to share this one planet. The decisions that you make about operations, logistics, and supply chain management, can have a big impact on the condition of that planet, and the quality of life for all of us. And the great news is that becoming a sustainability champion can actually help you drive efficiency improvements throughout your entire supply chain.



## Connect distribution center processes

- From the time a product is manufactured until it's delivered to a customer or a store, there's a good chance it will be routed through several distribution centers, so for operations managers it's important to understand how distribution centers work and the roll they play in your supply chain. Let's walk through the five major processes found in every distribution center and see how to link them together to keep products moving smoothly. First, the shipment is delivered to one of the inbound dock doors and unloaded into the receiving and inspection area. During this step an associate will log the shipment into a special software called a warehouse management system, and they'll inspect the product for damage. Once the shipment is received, it needs to be stored or put away. The warehouse management system uses a process called slotting to determine the best storage location for each product based upon its size and weight. When the put away instructions are issued, a warehouse associate will move the product from the receiving area to a location in the warehouse or storage area. The product will stay in that storage location until an order is received. When an order comes in, a warehouse management system or a warehouse execution system issues instructions to retrieve the product from inventory. These instructions are called pick tickets because they tell an associate to pick the product up from the storage area and deliver it to the packaging area. In the packaging area, each product will be combined with the other products that were ordered by the same customer. Each different product represents a line on the customer's order. One of the most common metrics for a distribution center is the line fill rate. The line fill rate is the number of lines ordered divided by the number shipped. It works like this. Let's say a distribution center received an order for four different products but was only able to ship three of those four lines. Then the line fill rate would be 75%. While the line fill rate is the most common, some facilities also measure fill rates based on cases, SKUs, or the value of the products. Once the products have been packaged for shipment to a customer, they're staged in the shipping or outbound area. Consolidating all of the boxes that will be

shipped on the same truck means that they can be loaded quickly when the truck arrives. It also makes it easier to prepare the shipping paperwork, such as the bill of lading. What happens next depends on whether the distribution center uses a drop and hook system or a live load and unload system. With a drop and hook system the shipment is preloaded onto a trailer, and when the trailer is ready a truck hooks up and drives away with it. With a live load and unload system, workers need to wait for a truck to arrive and then load the trailer while the truck and the driver wait. Many distribution centers are now automating some or all of these processes. But whether the work is being done by a person, a robot, or an automated system, the five basic processes are still the same. When you understand how these processes fit together, you'll be able to make better decisions in your own operations. And that will help you be more successful as a supply chain management professional.

## Drive continuous process improvement

- Business icon W. Edwards Deming said, "If you can't describe what you are doing as a process, "you don't know what you're doing." As a manager, once you understand your process, then your job is to find ways to make that process even better. So I want to share three powerful techniques for continuous process improvement and explain how each of them can help you drive improvements in your own supply chain. Let's start with Six Sigma. Six Sigma is a mathematically-based approach that uses facts and data to reduce the variations in a process. The goal of Six Sigma is to make every process repeatable, to ensure it works exactly the same way each and every time. When a process is repeatable, we say that it's stable, or in control. When you use Six Sigma to improve a process, you follow a five-step approach called DMAIC. Define, measure, analyze, improve, and control. Lean is a management philosophy that was first developed by Toyota as a different way to run their manufacturing business. That's why you also hear it called the Toyota Production System. It's also why many of the key terms are Japanese words. The goal of Lean is to ensure that everything flows smoothly in a supply chain. There are three things that interfere with

flow: Mura, Muri, and Muda. Mura is unevenness or variation. Mura leads to interruptions in flow, which makes a supply chain less efficient. In other words, it creates waste. Muri is overburden. When you use equipment too hard, it's more likely to break down, so Muri causes waste too. And Muda is waste itself, the stuff that costs money without adding value, like waiting and overproduction, or unnecessary transportation and untapped skills. There are actually eight different kinds of waste and you can remember them with the acronym TIMWOODS. The benefit of a process improvement can usually be measured as a reduction in one or more of these eight wastes. So the goal of Lean is to create smooth, balanced flow in a supply chain by eliminating Mura, Muri, and Muda. The final process improvement philosophy is the Theory of Constraints. This approach comes from a novel called *The Goal* by Eliyahu Goldratt, and it's designed to help manage capacity. Goldratt tells the story of a factory that's very inefficient and explains how they improve by always focusing on the slowest step in their process, their constraint. They achieve the goal of making the factory run smoothly by always improving the constraint, because that's the one step that's slowing all of the others down. For a closer look at how to implement these process improvement techniques, check out the course from my friend Chris Croft, *Process Improvement Foundations*. To learn more about implementing Lean, check out Steven Brown's course, *Lean Foundations*. And for more detail about Six Sigma, you can watch Richard Chua's courses. And remember, the way you make process improvements is through a series of projects. So for tips and techniques to help you lead all of your projects more successfully, check out my course, *Leading Projects*. In any manufacturing or distribution process, your objective is to have a smooth, steady, efficient flow. Six Sigma, Lean, and Theory of Constraints are three different process improvement approaches that can help you reduce the unevenness in your supply chain operations and deliver better results for your business and for your customers.

**Embrace omni-channel fulfillment**

- The internet has had a huge impact on retail business. We used to go shopping in stores and sometimes, we still do. But now we also shop on our phones, tablets, and computers. So figuring out how your customers want to buy your products and how to deliver them efficiently can be a real challenge. In this video, we'll explore the concept of omnichannel fulfillment where you sell products both in stores and online, and we'll see why the growth of omnichannel is having such a profound impact on retail supply chains. Let's start by looking at how the supply chain works for a traditional brick and mortar store. Products are delivered to a distribution center on a pallet. This is called a unit load because you're moving individual items as a single unit. Then, the pallet will be shipped from the distribution center to a large store. For smaller stores, the pallet may be broken down into cases and the cases ship to the store. But in either scenario, there isn't much handling required in the distribution center. Once the products arrive in the store, an associate places them on a shelf. Then, customers come into the store, pick up the products they want, and carry them home. Now let's look at how an ecommerce fulfillment center works. Just like in a distribution center, the products arrive as a unit load. But rather than shipping out a whole pallet or a few cases, an ecommerce fulfillment center will ship out each individual item as a separate order. That means you have to hire people to do work that used to be done by your customer, retrieving the items they want from your inventory and then delivering them to their homes. Because ecommerce fulfillment centers have to do so much more handling, they've been early adopters of automation technologies and robotics. The important point here is that the way customers get filled is actually very different for a brick and mortar store than it is for an ecommerce fulfillment center. And the challenge that retail businesses are facing is that customers want both options. They want to buy products in a store and carry them home, and they want to buy the same products online and have them shipped to their home. Then, of course, there are customers who want to buy your products online and then pick them up in a store or they may want to buy in a store and have products delivered to their house. Dealing with all of these channels can be overwhelming. For large companies, the best approach to this challenge may be to have two different supply chains. They can do in-store pickup through their stores and ship ecommerce and home delivery

orders from an ecommerce fulfillment center. Small companies might need to ship ecommerce and home delivery orders from a traditional distribution center or from the back room of their retail stores. There are some third-party logistics providers that offer another option. They're running ecommerce fulfillment centers that ship products for several retail stores. That way, retailers get the benefit of having a dedicated ecommerce supply chain without having to invest in building a new facility. Technology is changing the way that customers buy products and the way that companies fulfill orders. Optimizing your omnichannel fulfillment is one way to ensure that you're meeting your customers' needs and positioning your company for success.

## Analyze your supply chain risks

- Have you ever noticed that when you're in charge of managing an operation, it can feel like you're always putting out fires? That makes it hard to devote time and energy to other important responsibilities like process improvement, information security, and employee morale. In order to get out of that reactive firefighting mode, you need to be prepared for surprises, and one of the best ways to prepare is by using a risk register. In this video, we'll use the word PREPARE to build a risk register using a simple but powerful seven-step process. Building a risk register starts by considering what risks are possible. This is when you need to get creative and think outside of the box. Get your team together and brainstorm about anything that could have an impact on your work. Depending on where you're located, hurricanes, earthquakes, and forest fires are all examples of possible risks. Next, for each of those possibilities, consider the results. How would your operations be affected if one of those risks came true? Each risk might have several results. For example, if you were hit by a hurricane, you might lose electrical power, some of your staff might be unable to come to work, and your inbound shipments could be delayed. These are all different results from the same possible risk. Now, for each of those results, estimate the impact. I suggest that you come up with a scale from one to 10, with one being a minor impact and 10 being the most severe. You're just estimating, so don't

worry about being too precise; just be consistent. The next step is to go back and determine the probability of each possible risk. How likely is it that each of your risks might occur? Again, create a scale from one to 10, with one meaning it is unlikely but still possible and 10 meaning you know it's going to happen, you just aren't sure when. With this data, you can begin to analyze your risk profile. Your risk register can automatically calculate a risk index by multiplying the probabilities by the impacts. You can use these risk indexes to determine which risks you need to focus on first. The next step is to determine how you will respond to each risk. The truth is, you only really have four options. You can accept the risk and do nothing, or you might be able to avoid the risk by making changes to your supply chain. You might also be able to transfer the risk to someone else, either by buying insurance or by assigning it to them in a contract, or you can mitigate the risk. In other words, you can do things to make the risk less likely to occur, or to make the results less severe. Now your risk register is complete, but you're not quite done, because the last step to prepare for supply chain risks is to educate your team about the risk register and your risk management plans. Everyone needs to know what they're supposed to do when a risk emerges. Using the PREPARE system is an easy way to create a risk register that will help you be more proactive as an operations manager, and that will make you more successful as a leader.

## Prepare your business continuity plan

- What would happen if the building that you work in was destroyed by a fire? What if a construction crew accidentally cut your internet trunk line? Or what if your entire region lost power because of a blackout? Unfortunately, crises like these occur all the time, and operations managers need to help their teams plan ahead so they can respond quickly and effectively. Let me walk you through a four-step process that can help you prepare for these unexpected disruptions. It's called business continuity planning. The first step in business continuity planning is to do a business impact analysis. This is a list of the things that you think could go wrong and how they would affect your business. For example, you might find that there's a risk of wildfires around

your facility. There are a number of potential impacts from this risk but two of them include a loss of electrical power and an inability for your employees to get to work. So any work that depends on having electricity or having employees in your building will probably be impacted. The next step in business continuity planning is to develop recovery strategies. What are the things that you could do to mitigate the impact of a disruption? Your recovery strategy for a wildfire could be to have a backup facility available for emergencies or to provide your employees with tools that allow them to work remotely. Once you've identified your recovery strategies, the next step is to turn them into a business continuity plan or BCP. The BCP needs to be clear and detailed enough that people can follow it step by step. There is nothing worse than trying to interpret a complicated BCP while your whole team is in the middle of a crisis. That brings us to the last step in business continuity planning, practice. The goal of business continuity planning is not to create a set of instructions that sits on a shelf. The goal is to make sure everyone on your team knows what to do and how to do it. Many companies require their employees to participate in evacuation drills as part of their BCP process. Other companies run tabletop exercises where they present a scenario and then practice going through the steps to respond. It's hard to know what challenges tomorrow will bring for your operations. Your business changes over time and so does the environment in which you operate. So it's important to repeat this process periodically to keep your plans up to date and to keep them fresh in the minds of your team members. No matter what happens around us, we owe it to our teams and our customers to adapt and overcome. Business continuity planning helps minimize the effects of a disaster and get your business up and running again quickly. The sooner you can get things back to normal, the more valuable you'll be to everyone in your supply chain.

### Strengthen supply chain cybersecurity

- Imagine what would happen if someone took away your computers or if a hacker got into your sensitive files. How would you run your business? What would you tell your customers? Cybersecurity isn't just an IT problem

anymore, it's an issue for operations and supply chain managers, too. So let's talk about the risk that a cyber attack can create for your business and explore ways to protect your company through good cybersecurity practices. And let's start by looking at five reasons a hacker might target your company. Industrial espionage can occur if your firm has any kind of intellectual property such as trade secrets, research, or complex designs for a product or process. The goal of industrial espionage is generally to steal your ideas. Firms that sell digital products such as electronic books or music can also suffer from theft and counterfeiting of these digital products. There's also a lot of identity information that hackers can steal from you like information about your customers, including their credit card numbers. Or, they can steal your bank account numbers or your employees' personal information. Your company can also become a target for sabotage. Sometimes, these cyber attacks come from a person who wants to punish the business or get revenge such as a disgruntled employee or a customer. But sabotage can be random, too. Saboteurs could use viruses to hijack your systems or delete your files, or they could shut down access to your computers through a denial of service attack. One of the scariest threats are viruses called ransomware that are really a type of blackmail. Ransomware encrypts your files so that you can't access them until you pay a fee to the hacker. There are some simple strategies that can help you protect yourself from all of these cyber attacks. Let's look at three elements that are common to all good cyber strategies. First, you need to address network security. Make sure that your systems are protected with reliable software and with the latest updates. Even the best software ships with weaknesses called zero-day vulnerabilities. As these problems are found, software companies publish fixes but if you don't apply the latest updates to your software, then your computers are vulnerable. Network security also includes antivirus software and network firewalls. And remember, your network security needs to apply to every piece of equipment, printers, HVAC systems, and your internet of things devices can all be targets for a hacker who's trying to access your network. Next, there's the issue of password security. You need to have passwords that are hard for hackers to guess. You should also require people to change passwords frequently and make sure they understand the importance of not sharing them with others. And, make sure



that your network administrators have a robust password strategy, too. I've seen too many administrators put their entire organizations at risk by using passwords that were easy to guess and then not changing them regularly. Finally, there's the issue of physical security. If hackers can get physical access to your systems, then it becomes much easier to steal your information or infect your computers with malicious software. For a deeper look at cybersecurity and ways to protect your company, check out Malcolm Shore's course, Foundations of Cybersecurity. Today's supply chains depend on information and technology, but that also makes us vulnerable to cyber attacks. Implementing a strong cybersecurity program can help you ensure that your operations run smoothly and that you're able to meet your business goals successfully.

## Track and trace your products

- You can't fix a problem if you can't see it, yet many companies are only able to see a tiny fraction of their supply chain, and that means they end up reacting to crises that could have been avoided if they'd only known what was happening. So let's talk about track and trace technologies and the important role that they can play in providing you with real-time supply chain visibility. To start with, let's map out a simple supply chain that we use as an example. Here we have a supply chain with three nodes: a manufacturer, a wholesaler, and a retailer. In between each of those nodes we have logistics providers who move the product on trucks, trains, airplanes, and ships. Retailers do their best to balance supply with demand, but the supply chain can actually be unpredictable. The manufacturer or wholesaler might need to close down because of a severe storm. A third party logistics provider might go bankrupt or a ship might sink. These things happen, but if you know where your products are in the supply chain, then you can respond quickly so that you minimize the impact on your business and on your customers. Of course, in order to track your products you need to assign identification numbers to every package. There are three common ways to put identification labels onto a product to make it easy for machines to read the ID number. The first is to use a barcode. Barcodes are patterns of lines that

represent numbers and can be easily read by a computer. The second is to use a quick response code. In addition to storing serial numbers, QR codes can contain data and instructions. For example, a QR code can contain links to a website or an email address. QR codes can be read using common devices like a smartphone or a tablet. The third common approach for labeling products is radio frequency identification or RFID. While barcodes and QR codes can be read using a camera, RFID tags are small, electronic devices that use radio waves to transmit data to nearby readers. Some RFID tags can also be read by smartphones, but most of them require specialized readers. Barcodes, QR codes, and RFID can all make it easy for anyone in your supply chain to scan your products and update their location. For larger shipments you can also use GPS transmitters to provide location updates. The next issue to consider is where you'll store the data about your products and their location. You might store them in an internal database and grant your suppliers access to update that database. Or you might host your database in the cloud so that your supply chain partners can update it without accessing your internal network. A rapidly emerging trend is to track product movements using a blockchain. A blockchain is a database that is shared by several different companies to make it easier for all of them to provide updates, even if they don't work together directly. Having visibility in your supply chain can help you make better decisions about spending money on expedited transportation or safety stock inventory. When there's a crisis, having visibility allows you to be more agile and lets you focus on critical priorities. As you think about ways to improve your supply chain, consider what it would be worth to know where all of your products are and what condition they're in. You might just find that an investment in track and trace technology can provide a lot of value.

## Improve your sales forecast

- Forecasting is a fancy name for guessing about what you expect to happen in the future. Every business depends on forecasts to plan ahead and make critical decisions, so understanding how forecasting works is a really valuable skill. In this video we'll look at some key concepts that will help you use

forecasts more effectively. We'll look at the two different types of forecasts, two common patterns that occur, and two different ways to measure forecast accuracy. The first thing to remember about forecasts is that there are only two ways to create them. With a quantitative forecast you assume that the future will resemble the past, so you use statistics from historical data to try to predict the future. For example, if you've sold an average of 10 units per month in the past, you'll probably sell about 10 units per month in the future. While quantitative forecasts are built on historical data, qualitative forecasts are based on judgment. For example, what if you're introducing a brand new product? You won't have any historical data to work with so you'll need to use your judgment to create a qualitative forecast. Qualitative forecasts can be based on the judgment of one expert or on the judgment of a group of people like a focus group. The next thing to remember about forecasts is that they often reveal patterns. For example, if your forecast goes up or down by the same amount each month, then that indicates a trend. The next pattern to look for is called cyclical or seasonality. For example, this is when you'd expect a forecast for sales of mittens to be high in the fall and winter and low in the spring and summer. Seasonality is a repeating pattern, and it looks like waves in the forecast. It's possible to have a trend occurring at the same time that you have seasonality. The third thing you should know about forecasts is how to tell whether they're good or not. There are two things to look for when evaluating your forecast accuracy, error and bias. The difference between your forecast and the actual results is called the error. You can expect to have some error in any forecasting process. Naturally, the less error you have, the more accurate your forecast will be. Now if your forecast is consistently higher or consistently lower than your actual results, it's biased. A forecast that's biased too high, like this one, will lead people to be overly optimistic. A forecast that's biased too low can leave people unprepared for the work they need to do. While the basic concepts of forecasting are pretty straightforward, actually doing the math can be tougher. The good news is that spreadsheets like Microsoft Excel have lots of forecasting features built in. For a deeper dive, check out Wayne Winston's course, Excel Data Analysis: Forecasting. Understanding how to create a forecast and how to tell whether your forecasts are accurate can help you do a better job of planning for the

future, and better planning is guaranteed to make you more successful when managing your supply chain operations.

## Use sales and operations planning (S&OP)

- Supply chain management is full of trade-offs, and one of the most challenging is the balance between inventory and customer service levels. This really boils down to aligning supply with demand. In this video we'll look at a process called sales and operations planning, or S&OP. Many companies use S&OP as a foundation for aligning supply and demand in their supply chains. Your sales department drives the demand for your company. If your sales department is like most, they want to have a live selection of products to sell, and they want to keep all of them in stock. On the other hand, your operations team is in charge of supply. Operations is pushing to reduce inventories so they can free up working capital and increase the profitability of your company. These business goals are actually in conflict. How do you know that you're buying and making the right amount of products to meet your customers' needs but no more? That's where S&OP comes in. First, you need to decide how far in the future you should be planning. The longer the lead time is for the products you sell, the further into the future you need to plan. Let's say you choose a planning horizon of one year. Then for each of those 12 months you need to develop a sales forecast or a demand plan. I know, it's hard to predict the future. That's why we often joke that the first law of forecasting is that the forecast is always wrong. But you need a place to start, so just do the best you can. Once your sales team is ready to share their demand plan, then your operations team can review it and create a supply plan. Now at that point they may decide that they don't have enough machines, people, or inventory to meet all of the sales goals. In other words, the operations team may identify constraints. Once a constraint is found, it can be resolved. Of course you might need to invest in new equipment or hire more people to do that. Or if it makes more sense for your business, the sales forecast can be lowered. In other words, you can make a choice to give up some potential revenue on the demand side because you want to avoid the cost that would be required on the supply side. S&OP is an

iterative process. You start with guesses and revise your estimates until they become a plan. Then you need to update the plan on a regular cycle. The more volatile your supply and demand are, the more frequently you need to revise your S&OP plans. You can find more information about S&OP in my book, *Supply Chain Management for Dummies*. There are also several software companies that sell S&OP tools, and the Institute for Business Forecasting hosts S&OP conferences around the world. If it feels like your supply chain is struggling to profitably meet the needs of your customers, spend a little time looking at how you do sales and operations planning. Implementing S&OP is a great way to ensure your team's business decisions are aligned around the same goals and assumptions. That alignment will help you reduce waste, improve agility, and create a sense of shared accountability for the performance of your entire supply chain.

## Invest in innovation

- In a world of constant change, the survival of your business depends on your ability to innovate. If you aren't constantly looking for ways to improve, then you're basically surrendering to your competitors. There are really two kinds of innovation that you need to think about in any supply chain. Sustaining innovations are small incremental improvements. Disruptive innovations are the game changers. Each requires a different approach and a different set of tools. A good example that illustrates sustaining and disruptive innovations is the history of the music recording industry. The phonograph was invented by Thomas Edison in 1877. For about 100 years, the way that people bought music was to buy a record. Throughout that time, a series of sustaining innovations gradually improved the technology for manufacturing and for playing records. But then came the cassette tape and the CD and now streaming music. Each of these was a disruptive innovation that transformed the way music recordings were sold. And each of them basically made the previous technologies obsolete. You can drive sustaining innovation using process improvement methods, like lean, six sigma, and theory of constraints. But disruptive innovation is different. Disruptive innovation requires you to be really creative. In many cases, it means

imagining ways to destroy your own business. In fact, one of the common questions that triggers disruptive innovations is "How can I make my business obsolete?" That's hard for many companies to imagine, but it's important because there are other people out there trying to figure it out. And if they figure it out before you do, then you've got a real problem. A book that I highly recommend is called *The Innovator's Dilemma* by Harvard professor Clayton Christensen. Christensen argues that big companies are good at sustaining innovation, but they struggle with disruptive innovation. After all, why should they destroy a business that's making money by making that business obsolete? On the other hand, small companies tend to be really good at disruptive innovation, but they often lack the resources and the process discipline to support sustaining innovations. So, disruptive new technologies and business models often come from small companies, because they're able to move more creatively and move more quickly. But those technologies and business models will get better over time through a series of sustaining innovations, often from larger firms. For more tips on how to manage innovation effectively, check out Drew Boyd's course, *Business Innovation Foundations*. The lesson for supply chain managers is that you need to pursue both kinds of innovation. On the one hand, you need to use process improvement techniques to drive sustaining innovations so that you can keep ahead of your competition. But you also need to devote some of your time and money to pursuing disruptive innovations that could fundamentally change your business. In business, innovation is the key to improvement. And improvement is the key to your long-term success.

### Lead cross-functional projects

- Companies these days are in a constant state of change and the way that they make changes is through projects. Unfortunately, many projects end up failing but it may not be because of poor project management. The real cause of failure is often a gap in project leadership, especially in the case of complex cross-functional projects. In this video, I'll share a simple framework called the direct model that will help you lead your project

successfully. We'll cover the six things that a project leader needs to focus on in order to ensure success for their teams. The first thing that a project leader needs to do is define the objective. They need to clearly explain to everyone on the team what the goals of the project are and why they're important. One way to define the objective is to create a formal project charter that explains the goals and metrics for the project, identifies the people who will be working on the project, and specifies what things are in scope and out of scope. During the project, new people may join the team and priorities might change. Having a formal project charter can help to keep everyone on the same page. The next thing a project team needs to do is investigate their options. A good leader makes sure that their team thinks about things from different perspectives. Creativity and innovation can often lead to better solutions. But while creativity is good, project teams can also get mired down by analysis paralysis, so once the team has investigated the alternatives, the leader needs to make sure they resolve to a course of action. In other words, the team needs to make a plan and commit to it. When the plan is in place, the team needs to execute and the leader needs to hold the team accountable for getting things done and reporting on their progress. When the work of the project come to fruition, there is usually a change that needs to take place. Maybe you're replacing one information system with another, adding a new distribution center to your network, or shutting down an old factory. During these changes, there are often a lot of things that have to happen during a very short period of time. The leader needs to ensure there's a plan for how the change will be completed. Finally, the project leader needs to make sure that everyone is prepared to make the transition. In other words, they need to help people adapt to the change. For more tips and tools that will help you lead cross-functional projects, check out my course, Leading Projects. Leading cross-functional projects is actually a lot like directing a movie and by using the direct model to remember the six responsibilities of a project leader, you can help to ensure that your project teams will always be successful.

Calculate payback period and NPV

- Operations managers are constantly evaluating projects to improve their supply chain, and before you invest in a project you want to know two things, how long will it take to earn your money back and how much money will it make you in the long run. In this video, we'll look at two closely-related financial calculations that help you answer those questions, the pay-back period and the net present value. To give us an example, let's consider whether to buy a piece of equipment that will take a year to install and will last for four years. We'll need to pay \$100,000 at the end of the first year but then we expect to generate annual benefits of \$45,000. The benefits minus the investments each year equal the cashflow. Money loses value every year, in part because of inflation, so you need to reduce or discount the value of future cashflows to determine their equivalent value in today's dollars. This gives you the net present value or NPV. The formula for finding the NPV is kind of complicated, but the good news is that it's built into Excel and that makes it easy to do this calculation. For our project, let's use a discount rate of 5%. We said that we'll need to spend \$100,000 at the end of Year 1. Because that's a year in the future, it gets discounted by 5%. In other words, \$100,000 a year from now is equivalent to \$95,238 at the present moment. It's sometimes easier to understand NPV if you turn that around and say \$95,238 today will be worth \$100,000 in a year. As you look at the discounted cashflows, notice that the discounting compounds each year, so even though you're still earning \$45,000, the value of that cashflow in today's dollars get lower and lower the further into the future you go. Once we've calculated the discounted cashflows, we can add them up to find our accumulated discounted cashflow. In Years 1 through 3, you see that the accumulated discounted cashflow is still negative, but in Year 4 it becomes positive, which means we'll break even on the investment we made. In other words, this project has a four-year payback period. If we plot the accumulated discounted cashflow on a graph, the payback period occurs when the line crosses above zero, which is almost halfway into the fourth year of this project. For a closer look at using Excel to calculate an NPV, check out Curt Frye's course Financial Functions in Depth. Supply chain projects can have lots of benefits, from reducing costs to increasing revenues to avoiding future liabilities. The important thing to understand is that a shorter payback period and a higher NPV will make any investment more attractive. Translating



operational benefits into financial metrics will help you be more successful as an operations manager and help you excel as a true supply chain leader.

## Manage transportation decisions

- Imagine that your business is on the ground floor of a building. Your customers are up on 10 and you have three ways to transport your products to them. An elevator, an escalator, and a staircase. They all do the same basic job. They can all move your products from one floor to another. But each of these modes of transportation has different costs and different performance characteristics. In this video we'll see how to evaluate your transportation options and help you manage the trade offs between cost and performance. When it comes to transporting products you generally have several different modes that you can choose from. For example, to move things from one continent to another you might be choosing between a ship or an airplane. To move things over land you might choose between using a train or using a truck. Each of these forms of transportation is a different mode. The modes that you can choose from depend on the origin, where you're shipping a product from, and the destination. Each of these routes is called an OD pair. To choose the right mode for a shipment the first step is to decide what modes are available for that OD pair. Then you can evaluate each mode based on the criteria that are most important to your business and to your customers. Here are five factors that you should always consider. First, the speed. How long will it take to complete a delivery? Second, reliability. Are shipments often lost or delayed using this mode? If so, using that transportation mode might also mean you need to carry extra inventory or be prepared for stock outs. Third is quality. Some modes are more likely to result in damage to your products. Fourth is your product characteristics. Some chemicals aren't allowed on airplanes. Some products are too big to fit in a shipping container. You need to make sure that your product can actually be shipped using the mode you're selecting. And last but certainly not least is cost. Some modes cost more than others. Not surprisingly, the fastest, safest, most reliable modes of transportation also tend to be the most

expensive. Sometimes the best answer is to combine several modes for a single shipment. That's called a multi-modal approach. In addition to selecting a mode for your shipment, you also need to select a logistics company to do the work. Companies that provide transportation services are often called carriers. You might also hear them called third party logistics providers, or 3PLs for short. Keeping track of all of your shipments and all of your carriers is an important part of managing your supply chain. Special databases called transportation management systems can help you plan routes, assign shipments to your carriers, and track the flow of your products. So should you send your products to the 10th floor with the elevator, the escalator, or the stairs? It all depends on cost and performance, what you and your customers need, and what you're willing to pay for. Choosing the right modes, selecting your carriers, and managing your shipments are all critical decisions. But optimizing your transportation strategy will help you deliver products more efficiently and it will help you deliver more profits to your bottom line.

## Analyze the impact of lead times

- Have you ever run out of inventory and tried to get someone to deliver a new shipment immediately? If you have, then you know there's almost always a delay between the time when you place an order and when the product gets delivered. And those lead times can slow down your whole business. So in this video we'll look at what causes lead times, and I'll give you some tips for reducing the lead times in your own supply chain. When you start to analyze what's involved, there are actually several different components to lead time. First, there's usually some order processing time. When you send the order it takes a while for your supplier to receive it and process the order. Then there could be manufacturing lead time if the supplier has to make your products. And there's usually some transportation lead time, the time that it takes for a shipment to travel from your supplier to your facility. In business, time is money. Long lead times are bad because they slow things down and cause delays. So let's look at some techniques for reducing the lead times throughout your supply chain. One way that companies reduce lead times is through process improvement techniques like lean. Lean is

really a philosophy of optimizing the flow of materials through a supply chain. Because lean focuses on keeping the material moving it often produces shorter lead times. For a closer look at this approach check out Steven Brown's course Lean Foundations. Another way that your suppliers can shorten lead times is by holding inventory. If they have finished products available they can ship them to you as soon as you place an order, eliminating the manufacturing lead time. In some cases you can shorten transportation lead time by choosing a different mode. For example, you could ship an order by air freight rather than by ocean and get it delivered more quickly. Another technique that many companies are starting to use is called postponement. With postponement you keep inventory of partially assembled products. That way when an order arrives you can do the final assembly much more quickly. In other words, postponement is a way to reduce manufacturing lead time. We all want our businesses to be flexible and agile. But the reality is that it takes time to make and move things. So while reducing lead times can be challenging, it's actually a way to get a competitive advantage. If you can deliver a product faster than your competitors, then customers are more likely to buy it from you.

## Develop operations management skills

- Managing supply chain operations is tough, but there are jobs for operations managers in every industry and every region of the world. So if you like solving problems and you're up for a challenge, then operations management can be a great career. In this video, I'll share a list of 10 skills that successful operations managers are expected to have. These are skills that you can develop by taking courses, getting certifications, and building professional experience. And they're keywords that you can highlight on your LinkedIn profile and your resume. Of course, the first skill on the list is operations management. Operations management focuses on running a factory, a distribution center, or a store. It's about understanding what needs to be done, and using the people, processes, and technologies at hand to achieve those goals. For a closer look at what's involved in operations management, check out Eddie Davila's course, Operations Management Foundations. Next

is logistics management. Logistics refers to moving and storing products, and getting them where they need to be on time. I really like Steven Brown's course, Logistics Foundations. There are also logistics certifications available from APICS, from the Society of Logistics Engineers, and from the Chartered Institute of Logistics and Transport. An important part of both operations and logistics is inventory management, figuring out what you need to buy, when you need to buy it, and how much to buy. Both Eddie and Steven talk about inventory management in their courses, and there's an inventory management certification available from APICS. When you buy inventory, that's called procurement. You'll also hear people use the terms purchasing, sourcing, vendor management, or supply management. But all of them describe the process of deciding who to buy from, establishing the terms, and making sure that you're working effectively with your suppliers. You can earn procurement certifications from the Institute for Supply Management and from the Chartered Institute of Purchasing and Supply. When you tie operations management, logistics, and procurement together, you get a new set of skills called supply chain management. Supply chain managers look at all of the companies that need to work together in order to deliver your products to a customer. You can learn more from Eddie Davila's course, Supply Chain Foundations. You can also read about it in my book, Supply Chain Management For Dummies. And there are certifications available from the Council of Supply Chain Management Professionals and from APICS. Operations managers should always be looking for ways to improve efficiency. So two other skills that are important are continuous improvement and business process improvement. For some good training on these skills, watch Chris Croft's course, Process Improvement Foundations, and Steven Brown's course, Lean Six Sigma Foundations. The way that operations managers implement improvements is by planning and managing projects. There's a great learning path on this site called Becoming a Project Manager that covers this in detail. These courses can even help you earn a certification from the Project Management Institute. Finally, operations managers need to master cross-functional team leadership because they need support from people with a variety of skills from information technology to finance to human resources. In my course, Leading Projects, I describe an approach called the DIRECT method that I developed to help you

lead cross-functional teams effectively. Being an operations manager is a challenging role, but it can be very rewarding, too. Invest the time and develop the skills to do it right, and you can make a big difference for your company, for your team, and for your own career.

### Tips to reduce waste in your operations

- Every operations manager wants to trim the fat from their supply chain. Well, Toyota gets credit for creating a whole manufacturing philosophy called lean that's focused on just that: improving efficiency by eliminating waste from their processes. In this video, we'll go over the eight different kinds of waste that lean experts look for and that you can use to drive improvement in your own operations. The easiest way to remember the eight wastes is with the acronym TIM WOODS. T is for transportation. Moving people, products, or information from one place to another adds time and cost to your supply chain. When you look for ways to reduce the transportation between steps, you can often speed up a process and lower your costs. I is for inventory. Inventory acts as a buffer to balance the steps in a process, but it costs money, because it ties up your working capital. The more closely you can synchronize all of the steps in your supply chain, the less need you have for inventory. M is for motion. Every movement that a person or a machine makes consumes both time and energy. Positioning work close together can not only reduce the time required to complete a process. It can also make it easier for the people and reduce the wear and tear on your equipment. W is for waiting. Processes often get stopped because of missing parts or missing instructions, and when one process stops, it can have a cascading effect that causes delays throughout a supply chain. Identifying and resolving the issues that cause one process to stop can often eliminate wasted time in several downstream steps. And now for the two Os, overproduction and overprocessing. Overproduction is when you make more than what you need right now. The extra inventory costs money, because it ties up working capital. It also takes up space and is susceptible to theft or damage. As a rule, eliminating waste means you should keep everything in its lowest-value state for as long as

possible. Overprocessing is when you make things better than what your customers need or than they'll pay for. You're adding cost without actually creating additional value. That's not to say you should tolerate low quality. It means that you need to understand what your customers' specifications are and then meet those specifications exactly. Next comes D, for defects. If you make a defective product, you've wasted the materials that went into the product and the manufacturing capacity that you used to build it. When defects go undetected, they travel through a supply chain, consuming more time and eating up more capacity. In other words, defects continue to generate waste until they're stopped, so catching defects early is important, and eliminating them altogether is even better. The last form of waste to watch for is wasted skills. Companies can miss out on opportunities to create value and improve processes simply because they don't leverage the skills that their employees have to offer. It's easy for people to slip into a routine and overlook waste in an operation, but in today's competitive environment, no company can afford to be complacent. If you'd like to learn more about lean, check out the course Lean Foundations by Steven Brown. With Steven's instruction and a little help from my friend TIM WOODS, you can use the principles of lean to stay vigilant and make a real difference by eliminating the waste in your supply chain.

## Calculate return on investment

- Every project that supply chain and operations professionals work on is an investment. You're spending time and money to make a change, and expecting the results will be worth more to your business in the long run. But we sometimes struggle to communicate the financial impact of our projects. In this video I'll walk through the process of calculating the return on investment for a project. Calculating the ROI will help you translate the operational benefits of a project into financial terms. Let's use an example and say that you want to buy a piece of equipment that will cost \$100,000 and take one year to set up. When it's up and running at the end of the year, the new device will reduce your future costs by \$45,000 a year. It has an expected life of four years. So when you factor in the setup time and the expected life of

the equipment, this is really a five-year project. What do you think? Is it a good investment or not? Let's find out by calculating the ROI. Your investing \$100,000. Then you'll generate a benefit of \$45,000 a year for the next four years. So this investment will have a total return of \$180,000. When you take the total return minus the investment of 100,000, you have a net return of \$80,000. You'll earn this net return over five years. So take 80,000 divided by five, which gives you an annual return. Divide the annual return by the total investment of \$100,000 and that gives an ROI of .16, or 16%. In other words, you'll be growing your investment of \$100,000 at a rate of 16% per year. The higher the ROI the more attractive any investment is going to be. Is 16% a good ROI? Well, that depends on two things. First, it depends on your investment alternatives. You could be able to earn a better rate by investing your money somewhere else. Some companies even have a minimum ROI, called the Hurdle Rate. And unless your project's ROI is above that Hurdle Rate, it probably won't even get considered. The second thing that your ROI depends on is inflation, because money becomes less valuable over time. In four years \$45,000 won't buy you as much as it will today. You can account for that annual loss in value by factoring in a discount rate. Understanding how ROI is calculated can help you make adjustments to your projects, too. For example, you can increase the ROI in two ways, either by making the investment smaller or by making the returns bigger. For a closer look at ROI, discount rates, and investment analysis, check out Rudolph Rosenberg's course, Making Investment Decisions. Operations and supply chain professionals understand that the future is full of uncertainty, but part of your job as a manager is to make educated guesses and plan ahead for your business. If you can make reasonable assumptions and calculate a return on investment, you'll find it much easier to justify the importance of your projects and to get the resources you need so that you can manage your operations successfully.

Prevent counterfeiting

- Brands are valuable assets that help companies differentiate their products and build relationships with their customers. But the stronger your brand is,

the easier it is for crooks to make big bucks by selling counterfeits. Branding expert Mike Wagner says your brand is your promise. So, in this video, we'll look at how counterfeiting affects your promise to your customers and I'll give you tips for protecting your supply chain from this growing threat. Unfortunately, criminals have discovered that making counterfeit products is an easy way to generate high profits. And if they happen to get caught, the penalties tend to be pretty light. So the risk reward calculation makes product counterfeiting attractive to crooks and with sophisticated manufacturing technology available all over the world, the equipment needed to make fake products is easily accessible. So no matter what you make, there's a good chance that someone is trying to compete with you by selling a counterfeit version of your own product. Counterfeiting is not a victimless crime. Counterfeit products are made with low quality materials which means they're likely to fall apart. When it comes to fake products like cosmetics, counterfeits often contain harmful chemicals. And fake parts for equipment wear out quickly and that could cause damage to a machine or even hurt someone. How can you protect your supply chain from the dangers of counterfeiting? The first thing you need to do is to protect your intellectual property. Make sure that you have patents, trademarks, and copyrights in place so that you have a legal basis for protecting yourself. When you're working with suppliers and customers, use non-disclosure agreements and trade secrets to keep information secure. Next, ensure that you have good security practices in place to protect yourself from cyber criminals and from industrial espionage. If you allow customers or suppliers to access your facilities or your information systems, make sure that they have good security practices in place, too. Third, when you do find counterfeits, act on them. Don't assume that a single counterfeit product is an isolated event. It could be a clue that helps you uncover a bigger problem. The more willing you are to investigate and prosecute counterfeiters, the less attractive you become as a target. By the way, a great place to look for counterfeits is in your reverse supply chain. Customers often end up returning fake products to legitimate companies because the products don't work properly. Fourth, mark your products. There are lots of subtle ways to tag products that make it easier to separate real ones from fakes. Some of the options include color shifting inks, holograms, RFID, and even labels



which contain DNA. Many of these technologies were developed to prevent counterfeiting of currency and passports, but they're now being used in supply chain applications too. And fifth, use track and trace technologies. If you can track every handoff in your supply chain, then it becomes much harder for a counterfeiter to sell their products into your legitimate channels. Preventing fake products from making their way into the marketplace is an important part of supply chain management. And by protecting your brand against the threat of counterfeiting, you're helping your business keep the promises you've made to your customers.

## Manage employee turnover

- When employees leave your company, it's called attrition or turnover. And while every employee will move on sooner or later, understanding the dynamics of turnover in your business can provide useful management insights. Let's look at how to calculate employee turnover and how this metric can help you manage your operations more effectively. It's common to think about employee turnover in two main categories, voluntary and involuntary. Voluntary turnover is when people leave because they want to. It could be that they've accepted a new job, are retiring, or they're taking time off to be with their family. Involuntary turnover is when the company terminates an employee or eliminates their position. Both kinds of turnover cost money and can impact the efficiency of your operations. For example, if you're replacing an employee, you'll need to spend time and money posting the position, interviewing candidates, and training their replacement. And even if you aren't replacing them, you may still need to train someone to take over their responsibilities. The new employee may be less efficient until they've had some experience in the job. And depending on the circumstances, you may have other costs to deal with, such as severance payments or legal fees. So, as an operations manager, you should be tracking data about employee turnover because it affects your costs and your performance. To calculate employee turnover, first you add the number of employees at the beginning of a period to the number of employees at the end of the period, and you divide that by two. That gives you the average

number of employees. Now take the number of employees that you lost during that period, and divide it by the average. And there you have the turnover. For example, let's say your business had 450 employees on January 1st and 470 employees on December 31st. The average number of employees for the year is 460. And let's say that you terminated eight employees during the year and had 16 who separated voluntarily. Your involuntary turnover rate would be eight divided by 460, or 1.7%. And your voluntary turnover rate would be 16 divided by 460, or 3.5%. That gives you a total turnover of 5.2% for the year. Tracking turnover from one year to the next can provide insights about your business and the labor market. For example, here's a chart showing the turnover for a company over five years. One thing you can see is that voluntary turnover has increased from four to 6%. This could mean that employees are unhappy at work or that their wages aren't keeping up with the market. Whatever the cause, the business is now spending 50% more on recruiting and training new employees than they were just five years ago. You can also see that involuntary turnover increased from year four to year five. It would be important to understand why they terminated so many employees. If you're looking for ways to reduce turnover, check out Don Phin's course on Employee Engagement. Voluntary and involuntary turnover are key metrics for understanding the human side of your business. Tracking turnover from one year to the next will help you be successful as you manage the delicate balance between human resources and operational excellence.

### Pick the right production strategy

- Companies that manufacture a product need to balance three goals that'll often conflict with one another: customizing products to meet their customers' needs; filling orders quickly; and keeping costs low. Let's take a look at three different manufacturing strategies that can help you manage these trade offs and find the right balance for your supply chain. We'll use the example of buying a car to show how each of these manufacturing strategies work. Imagine walking into a dealership and looking at one of the cars on the showroom floor. That car's actually inventory or stock that was

manufactured using a Make to Stock production strategy. With a Make to Stock strategy, you manufacture products in advance so you have them ready for a customer to buy and you can keep manufacturing costs low and provide customers with short lead times because you're planning ahead. But the drawback is that it's often hard to predict how much your customers are going to buy and when they're going to buy it. As a result you end up carrying inventory which eats up working capital for your business and increases your overall operating costs. Now let's say that you want a car that isn't in the showroom. You want your car to be a red convertible with the luxury package. Instead of carrying every possible configuration for the car in their inventory, the dealer can use a Make to Order production strategy. With a Make to Order strategy, the factory would have all of the parts ready but they wouldn't assemble your specific car until they've received an order, and because they're making that product for a particular customer they can tailor it to their exact preferences. Make to Order reduces the cost of holding on to inventory but it means that your customers will need to wait a little longer. Waiting is bad because sometimes customers need the product right away, so they might decide to buy it from one of your competitors instead. Also, with a Make to Order strategy, it can be harder to plan your production schedule, which could end up increasing your manufacturing costs. Now, let's say that you want some really special modifications to your car, like installing a race car engine. That brings us to the third manufacturing strategy: Engineer to Order. With an Engineer to Order strategy the product is totally customized, so you can't buy the parts in advance and you can't start producing the product until you've received specifications from your customer. An Engineer to Order strategy usually has the longest lead time and the highest cost, but your customer gets exactly the product they need and you don't spend money on inventory. Every manufacturer uses a combination of Make to Stock, Make to Order and Engineer to Order in their supply chain. When you use the right production strategy to manage the trade offs in time, cost and customization, you can design a supply chain that aligns with your customers' needs and maximizes the profitability for your operations.

Adopt strategic workforce planning

- Recruiting isn't an expense. It's an investment. It's money that you need to spend to hire the people who will make your company more money. And like any investment the key is to figure out how to create the most value for your business with every dollar that you spend. In this video we'll look at a process called strategic workforce planning that can help you align your recruiting investments with your business needs. To begin strategic workforce planning you create a census that shows how many people you employ today. In this example, the census is segmented based on job types and office locations. Next, you review your business plans and decide how much you expect the size of your workforce to change. The offices in this example are all growing but at different rates. So to keep it simple, each office assumed the same annual growth rate for all of their positions. Now you can multiply the current census counts by your growth rates and that gives you a workforce target. This is the number of people you expect to have in the future. Check your business plan to make sure that your budgets match up with this workforce target. Now, your workforce target minus your current census gives you your growth hires. This is the number of people that you'll need to hire to support the growth of your business. But you're not done. Next you need to factor in turnover, or attrition. It's natural to lose some people because they take promotions, move to other companies, or retire. In this example, the company has an annual attrition rate of 3%. The attrition rate times your workforce target gives you your replacement hires. This is the number of additional people that you need to hire to backfill folks that leave your company. Your growth hires plus your replacement hires equals your annual recruiting target. In supply chain terms, this is your demand forecast. It's an estimate of the number of candidates that you expect to hire in the next year. Now that you have a demand forecast you need to identify your sources of supply. In other words, where will you recruit new employees? This company plans to recruit almost 350 associates from local high schools. The strategic workforce plan gives them data to justify investments that will make it easier to fill those roles. For example, they may decide to sponsor recruiting events that will get students excited about joining their team. At a high level, managing your recruiting process is really about

having the right supply to satisfy your talent demands. When a business can't hire the people they need quickly, everyone suffers. It causes burnout among employees, which leads to high attrition and low customer satisfaction. Using a strategic workforce plan to manage your talent supply chain can help you make smart recruiting investments so that you can fill openings quickly and keep your operations running smoothly.

## Optimize your inventory

- Whether you work in retail, wholesale or manufacturing there's only one thing worse than having too much inventory and that's not having enough. When you run out of inventory you're missing out on sales or you're shutting down a production line. In this video I'll show you two different ways to think about how much inventory you really need. The first way to use inventory is called cycle stock inventory. And it's really about decoupling steps in your supply chain. For example, let's say that a store gets a discount if they buy 10 widgets from their wholesaler. But their customers only buy one widget per day. The store can use cycle stock inventory to decouple these steps. If they order a new shipment once every 10 days, then they should always have one widget in stock to sell to their customers. The amount of money you spend on cycle stock inventory depends on the amount of product you buy at one time. As long as your timing is perfect then the average cycle stock is one half of the order size. So to reduce the cost of cycle stock inventory, all you need to do is reduce your order sizes. But be careful, when you reduce the order sizes, you'll need to order inventory more often. And that'll increase your transportation cost. Cycle stock is fairly easy to manage when you have steady levels of supply and demand. But real world supply chains are unpredictable. For example, what happens to the widget store if a shipment is delayed? Or if a customer buys three widgets instead of one? To handle this uncertainty you can use a second kind of inventory called safety stock. Safety stock inventory is a buffer that protects you from variations in supply and demand. The more variability there is in a supply chain, the more safety stock you need. Remember the benefit of having inventory is that you have products available to sell to your customers or to feed a manufacturing

line. But the more inventory you have, the more working capital you're tying up and the harder it is for your business to be profitable. So you need to balance the benefits of inventory against the costs. One way to find this balance is by selecting a target service level. Basically that means you decide how often you're willing to run out of a product. Many companies choose a 95% service level as their target, meaning that 95 times out of 100 they wanna have the items their customers want in stock. A higher service level will increase sales and customer loyalty, but it'll also increase inventory costs. A lower service level will save money, but it could mean they run out so often that they drive customers away. Once you choose a service level there are mathematical formulas that tell you how much inventory you should have. You can do these calculations by hand, but most companies use inventory management software to do it automatically. Managing inventory effectively is a critical part of keeping costs down while still meeting your customers' needs. And when you optimize cycle stock and safety stock levels, you can have a big impact on the profitability and the performance of your entire supply chain.

## Manage payment terms and cash flow

- In business, we're always negotiating around time, money and risk. Let's look at how the payment terms you negotiate with your customers and your suppliers can impact your risk and affect your financial performance. Let's start by looking at your suppliers. The simplest payment terms you can have with them are to pay on receipt or pay on delivery. In other words, you pay your supplier when they deliver the product. But some suppliers will require you to pay them in advance in order to lower their risk. Maybe they have to buy expensive materials to make your order and they're concerned that you might change your mind. By having you pay in advance, a supplier can mitigate their risk of doing business with you. On the other hand, a supplier might be willing to take on more risk in order to get more business. They can do this by offering net payment terms. Net terms are a form of credit, meaning that you can have their products now and pay for them later. For example, a supplier that offers net 30 terms will give you the product and wait for up to 30

days for you to pay for it. You might also consider a combination of payment terms to help balance the risk with your suppliers. For example, you might pay a deposit when you place an order, make another payment on delivery, and then make full and final payment 30 days later. The same logic that you use to negotiate payment terms with your suppliers can be used when negotiating how your customers will pay you. Managing your payment terms on both ends can have a big impact on your cashflow. First, let's look at a situation where you'd basically be loaning money to your customers. Let's say you pay your suppliers on delivery but then extend net 30 terms to your customers. That means you need to have working capital to cover 30 days worth of sales. Now let's look at what happens if your customers pay on delivery but you have net 30 terms with your suppliers. Instead of borrowing money from a bank, now you're depositing your customers' money for 30 days before you have to pay your suppliers. Two common ways to reduce the working capital that a company needs are to shorten payment terms offered to customers and lengthen payment terms to suppliers. But you need to do this carefully because your customers and suppliers are trying to make a profit too. Negotiating the right payment terms for your customers and suppliers isn't always easy, but it's a great way to use supply chain management to deliver measurable value to your company's bottom line.

## Learn about MRP and ERP planning systems

- When you're in the business of manufacturing a product, having the components you need when you need them is essential for keeping your lines running. In this video, we'll look at two kinds of supply chain information systems that can help you decide what you need to order and when you need to order it to ensure that you don't run out. Now, let's clarify that for the purposes of supply chain management, resources include machines, people, and components. A manufacturing resource planning system, or MRP, for short, is the software that captures the goals for a factory, and then schedules production and decides when to order inventory. Let's say that you manufacture candy, and you've received an order to make pumpkin-flavored

taffy. The MRP system will calculate how soon you have the manufacturing capacity available to make that taffy, and then it will create a production plan. Then, the MRP will look at the ingredients for the taffy. It'll check how much inventory you have for each item, factor in ordering lead times, and decide when to place the orders with your suppliers. In this case, the MRP will order three tons of pumpkins two weeks before the scheduled production date. In a perfect world, that whole process would be pretty straightforward. But in real-world supply chains, things change all the time. So, you might need to revise or replan your production schedule. And replanning can create problems with inventory. Let's say you have a supplier who needs three weeks' notice to fill an order. What happens if an emergency forces you to replan your production schedule, and you cancel an order just two days before they're scheduled to deliver it? Either they're going to end up with inventory they can't sell, or you're going to end up with ingredients for a product you've decided not to make. To fix this problem, MRP systems have a time fence, a set number of days during which the production schedule is frozen and no longer allowed to change. That time fence represents an important trade-off. The longer your time fence is, the easier it is to plan your production. The shorter your time fence, the more flexible and responsive you can be. MRP was really designed to create production plans for a single factory. But in today's supply chain environment, we often need to look across multiple facilities and take a more holistic view of our resources. An enterprise resource planning system, or ERP, can consolidate the MRP information from many different facilities. It's like an MRP, only bigger. It takes into account a broader range of information about customers, suppliers, and human resources. In a high-paced manufacturing environment, you simply can't keep track of what you're going to make and what you need to buy without having MRP and ERP systems in place. Understanding how they work can help you choose the right systems and use them correctly. And that will have a big impact on the performance of your entire supply chain.

**Use big data for operations management**



- Supply chains involve three flows: the flow of money, the flow of materials, and the flow of information. In this video, we'll focus on that third flow, information, and talk about how supply chain managers can leverage big data to make better decisions. Every transaction that occurs in a supply chain creates new data. When you think about all of the systems that are used by all of the participants in a supply chain, we're creating a huge amount of data every day. For every item we sell, we need data about how much it cost us, how much we charge for it, where it comes from, and what it's made of. For every customer we sell to, we wanna know how they're going to pay us, where we need to deliver the product, and what else they've bought from us in the past. We also collect data about suppliers, transportation providers, and manufacturing processes. And the data we collect can include documents, pictures, and even videos. And we almost never throw any data away. This all leads to the trend that we call big data. The good news about big data is that it should help supply chain managers make better decisions based on facts rather than on intuition. But the bad news is that the amount of data is growing so fast, that it can be hard to manage. When you collect data from your supply chain, you can store it on servers that you own and maintain yourself. This is called an on-premise approach. While on-premise solutions give you a lot of control, they can also be expensive to maintain, and they're difficult to scale. Cloud storage is when companies store their data on the internet instead of using on-premise servers. When data is stored on the internet, it's often spread across many different servers, and you have no idea where they're located. When you store data in the cloud, you don't need to buy as much hardware. You can just rent the storage space that you need from a company called a cloud storage provider, and you can access that data from any computer that's connected to the internet. So when your supply chain includes employees, customers, and suppliers around the world, a cloud-based solution makes it easy to collaborate. No matter where your data is stored, it's smart to think about how you can use it to make better supply chain decisions. By leveraging the power of the data that's flowing up and down your supply chain, you can help to create tangible value for your company, as well as for your customers and suppliers, and that's what supply chain management is all about.

## Optimize your perishable inventory

- Everyone knows that in business, time is money. And when you're selling perishable products and services, time can be really expensive. Let's look at some examples of perishable inventory and then I'll demonstrate how to use an equation called the news vendor solution to maximize your profits. When people hear the term perishable, they often think of food products, dairy, fresh fruits and vegetables are all perishable because they can spoil relatively quickly. But for supply chain professionals, any product or service that loses its value over time is perishable. Rubber products lose their elasticity, fashion items and electronics become outdated, even hotel nights and airplane seats lose their value if they're not sold. It turns out many of the products and services in our supply chains are perishable. So let's look at a way to minimize our losses from the effects of time. A classic example of perishable inventory is the problem facing a newspaper vendor. In the morning, she needs to decide how many copies of the newspaper to buy. If she buys too many, her unsold papers are worthless and she's wasted money on perishable inventory. But if she doesn't buy enough, she'll miss out on sales and disappoint her customers. So how much inventory should she buy in order to maximize her profits? The answer depends on how much profit she makes on each newspaper and how much demand she expects to have. We can calculate the optimal number of newspapers to buy in the morning using four numbers. The cost for the newspapers, the amount she charges her customers, the minimum amount she thinks she will sell, and the maximum amount she can possibly sell. Our news vendor solution looks like this. You take the price minus the costs divided by the price. Multiply that by the difference between the maximum demand and the minimum demand. And then add that to the minimum demand. That gives you the optimal inventory level. In other words, the number of papers the news vendor should buy. Let's say our news vendor buys papers for \$2.25 and she sells them for \$3. Her lowest sales in the last month were 350 papers in one day and her highest sales were 475 papers. So the optimal number of papers for her to buy each morning is 392. This is the simplest example of the news vendor solution but there are a lot of ways to adapt it to your specific

needs. That way, it can be used for any perishable item. In most cases, it'll be done automatically in your enterprise resource planning system, or some other piece of software. Maximizing your profitable sales is an important part of how supply chain management supports the business. Using a tool like the news vendor solution can help you optimize the inventory levels for your perishable items. And that's a great way for supply chain managers to have a positive impact on the bottom line.

## Track your inventory turns

- Inventory is an investment. It helps us make money because it allows us to meet our customers' needs quickly. But it also consumes capital, so you want to make sure that your inventory is turning over on a regular basis. Let's walk through an example that shows how to calculate your inventory turns so that you have a simple metric that can help you manage the efficiency of your supply chain. In order to calculate the inventory turns, the first thing we need to do is choose a time period. You can calculate turns weekly, monthly, or annually. For this example, I'll calculate our monthly turns. Next, we need to choose how to measure our inventory. Do we want to measure the cost of the goods, the revenue, or the quantity of items? I'm going with quantity this time because that data is often the easiest to get. Now we need three numbers. How many units did we sell during the month? How many units did we have at the beginning of the month? And how many units did we have at the end of the month? With those three numbers, we can set up the inventory turns calculation. Our turns will be the number of units sold divided by the number of units at the end of the period plus the number of units at the beginning of the period divided by two. Let's say at the beginning of the month we had 120 widgets in stock, and at the end of the month we only had 100. During the month we sold 55 widgets to customers. So our inventory turnover for the month is 55 divided by 110, or 0.5. People often ask, what's the right number of turns for my inventory? Unfortunately, that's not an easy question to answer. A higher number of turns definitely means that you're using your inventory more efficiently. But you're also more likely to have stockouts and low customer service levels. Optimizing inventory is an

important job that has a big impact on the bottom line. If you don't have enough inventory, then you're letting your customers down. If you have too much inventory, you're wasting money that could be invested in other parts of the business, or that you could be returning to your shareholders. Tracking your inventory turns can tell you a lot about the efficiency of your operations, and it can help you strike the right balance in managing your supply chain.

## Manage change and transitions

- "Progress is impossible without change, "and those who can't change their minds "can't change anything." That's my favorite quote from George Bernard Shaw. Supply chain processes and technologies are in a constant state of change. If we want to drive real progress, then supply chain professionals need to understand how these changes affect people. In this video we'll look at a model that you can use to clarify the difference between a change in your supply chain and the transitions that people need to make because of that change. The model was created by Dr. William Bridges. You can read more about it in his book, *Managing Transitions*. To start with, you need to think about any change that you're going to make from the perspective of someone who will be affected by it. Each person's world works in a certain way today. This is their current state. Once your change is complete, their world will actually be different. That will be their future state. They need to let go of the current state and embrace the future state. Dr. Bridges describes this as a three-step process. The first step is the ending, where people need to accept that the current state is going away. The second step is the neutral zone where people feel lost and confused. The third step is the new beginning, where people accept the future state as their new normal. These three steps are perfectly natural, but if you don't prepare for them, they can create a major obstacle for your projects. So helping people make transitions makes good business sense. First, be clear about what's going to change, anticipate the things that are going away and that people need to let go of. Next, be prepared for the neutral zone. People are going to seem lost for a little while. Their productivity may drop and they may ask a lot of

questions. They're likely to feel frustrated and even overwhelmed. If you know to expect this behavior, then it's easier to be patient while it's happening. Third, help people move on to the new beginning. Sell them on the benefits of the future state so that they're motivated to accept it. Give them the training, the education, and the support to be successful with the new tools and processes. We improve our processes and upgrade our technology continuously, so change management is an important part of every supply chain professional's job. But the transitions are just as important as the changes. When you manage transitions effectively, it helps to ensure that your changes deliver the results that you expect. That will make you more successful as a supply chain leader.

## Blockchain for supply chain

- One of the most interesting new technologies to emerge recently is blockchain. While blockchain started with digital currencies, the possibilities for supply chains are huge. In this video we'll look at what blockchains are and why they could be a useful tool for your supply chain. The easiest way to understand the blockchain is to think about it like a ledger. Imagine that you had a logbook where you kept track of every sale you made. Every time you make a new sale, you'd record that transaction in your ledger. With a blockchain, each of these transactions is recorded in a block of data, and the blocks are all tied together in sequential order so they form a chain. You can have many copies of a blockchain so you can share copies with your customers and with your suppliers. You might even share copies of your blockchain with your competitors so that you're all sharing information on the same platform. Now in order to keep all of the copies of the blockchain synchronized, you set rules for who can add new blocks to the chain and what information they can include. You can also set permissions for who can read the information in each block. Some blockchain platforms allow you to create smart contracts. Smart contracts are just like legal contracts except that they execute automatically. For example, a smart contract could automatically transfer money from a customer's bank into yours once they acknowledge receipt of a shipment. So blockchains could help solve three of

the big challenges that are present in today's supply chains. First, they can keep transaction information synchronized between different systems, and between different participants. In other words, they'd make it easier for everyone in a supply chain to collaborate. Second, they could improve the reliability of supply chain data by make sure that everyone's using one set of books and automatically enforcing the rules around who can make entries. Third, blockchains could increase trust across the supply chain. In international transactions, for example, blockchains could make it easier for banks to issue letters of credit and for customs officers to collect duties and and clear shipments. I like to say that supply chain managers need to synchronize three flows: the flow of money, the flow of material, and the flow of information. Blockchain-distributed ledgers provide a new approach to managing information flow. That could soon change many of the processes that occur in a supply chain. Blockchains aren't the right answer for every challenge, but it's a good idea to learn more about them. Because there's a good chance that blockchains will play an important role in the future of your supply chain.

## Choose meaningful metrics and KPIs

- You've probably heard the saying, what gets measured gets done. So let's talk about the metrics you're using to measure supply chain performance and I'll give you some examples that will help you select the right metrics for your own operations. We often refer to business metrics as key performance indicators, or KPIs. The goal in selecting KPIs is to come up with the smallest number of metrics that give you the best indication of how your business is really doing. The first way to think about these KPIs is to decide whether they should be quantitative or qualitative. Quantitative metrics are objective. Anything that you can measure with a tool, like a gauge or a computer, is a quantitative metric. And quantitative metrics are the best way to measure many of the operational processes in a supply chain. For example, the number of shipments you receive, the weight of each shipment, or the number of defects created by a process. Of course, financial metrics are quantitative, too. Qualitative metrics are subjective. They tell you

something about how people feel. Customer satisfaction is a subjective metric that can tell you a lot about how well your supply chain is working. And employee engagement can tell you a lot about your workforce. Most managers need to use a combination of quantitative and qualitative metrics in order to really understand how their operations are doing. Another thing that you should look for in KPIs is whether they're looking into the past or looking into the future. Many supply chain KPIs are focused on the past. These are called lagging indicators because they tell you about how a process was working, after the fact. Some common lagging KPIs include uptime, lost-time injuries, and first-time yield. The value of lagging KPIs is they tell you how a process actually behaved under a certain set of conditions. But for many management decisions, relying on lagging indicators can put you in the position of always being reactive. So you should also have KPIs that let you see into the future. These are called leading indicators and they help you become more proactive in managing your supply chain. For example, sales forecasts, economic indicators, and weather reports are all examples of leading indicators. Supply chain operations involve a lot of moving parts, so there isn't a single number that can tell you how everything is doing. Instead, you should look at several KPIs and track them on a scorecard. Spend some time thinking about the processes that define success for your supply chain. Then make sure you're looking at KPIs that are both quantitative and qualitative, and metrics that are lagging and leading. When you have a balanced scorecard made up of KPIs that are relevant for your business, you'll find it much easier to manage your priorities and you'll be able to drive continuous improvements throughout your entire supply chain.

### Build flexibility into your supply chain

- If we knew what was gonna happen tomorrow, managing a supply chain would be easy. But the future is full of uncertainty, so we need to prepare by investing in flexibility. The supply chain is commonly thought of in three segments: upstream, internal operations, and downstream. Let's look at two key concepts that can help you make smart investments in flexibility no matter if you're managing one of these segments or overseeing the entire

chain. When we talk about flexibility in a supply chain, we're talking about ways to mitigate risk. Risk is really just another word for surprises. Surprises come in two flavors: good surprises or opportunities. These are sometimes called upside risks. Bad surprises are threats, sometimes called downside risks. If we focus on the upstream supply chain, for example, an opportunity would be a supplier who offers a bargain deal on some of the materials we need. While a threat would be a supplier that shuts down because of a natural disaster. One way to mitigate a risk is to have choices. We call these choices real options. Real options give you flexibility. For a downside risk, your options help you mitigate the impact on your supply chain. For an opportunity, you want the flexibility to benefit from the surprise. In our example of the bargain from our supplier, the option we need is to have an agile procurement process that lets us take advantage of this opportunity. When a natural disaster affects our supplier, we could protect ourselves by working with more than one supplier. In that case, having multiple suppliers is the real option that gives us flexibility. Many of the real options that provide supply chain flexibility are going to cost money. You can think about it like you're buying an insurance policy. Just decide how much you're willing to spend in order to protect yourself from a risk. There are also ways to create flexibility that actually don't cost any money. For example, if you maintain a good relationship with your customers and suppliers, they can often collaborate with you and help you respond to surprises. When you can look at your supply chain in terms of risks and options for each segment, you can use flexibility to keep things moving smoothly. That smooth flow will help you be successful as a supply chain and operations manager.

## Automate your supply chain

- Have you heard the saying from business professor Warren Bennis about the future of manufacturing? The factory of the future will have only two employees, a man and a dog. The man will be there to feed the dog, and the dog will be there to keep the man from touching the equipment. In other side, supply chain managers need to embrace automation in order to compete effectively. Let me share my perspective on evaluating new supply chain



technologies. Running a supply chain involves lots of decisions and actions. For example, we make decisions about where to purchase raw materials, and we take actions that move products from one place to another. I break decisions and actions into tasks and then use a three-step approach to look for ways to do things better. First, I try to eliminate the task. Supply chains have a tendency to accumulate unnecessary tasks that don't provide value to the end customer. Eliminating a task altogether can often allow you to reduce costs, increase your supply chain velocity, and free up extra capacity. The 5 Whys technique can help you decide whether a task is really necessary. I explain how to use the 5 Whys in my course on leading projects. If I'm convinced a task is necessary, then the second step is to ask whether it can be automated. For data analysis tasks, computers may be able to crank through data and make decisions faster than a human analyst. When it comes to moving products around, robots and autonomous technologies are able to perform many tasks better, faster, and cheaper than people can. But there are still some tasks that are difficult to automate. For these tasks, the third step is to apply process improvement techniques. We have to acknowledge that automating a supply chain can eliminate some jobs. Warehouse robots, for example, often replace human workers. But generally speaking, automation makes the remaining workers more productive, and in many cases it creates new jobs too. For example, you need to have technicians who can install and maintain the robots. In the end, in order to remain competitive, supply chains need to leverage both people and technology to complete every task as efficiently and effectively as possible. Today's workplaces are being transformed by technology. The challenge for supply chain and operations managers is learning how to lead that change. We need to bring in new technologies when and where it makes sense with minimal disruptions. By staying up-to-date with the capabilities that new technologies offer, you'll be able to identify automation opportunities and make yourself invaluable as a supply chain professional.

**Optimize your lot sizes**

- When you work in a supply chain, you have to balance competing priorities. A good example is figuring out how much material you should order each time you need to replenish your inventory. We call this order quantity the lot size. Let's look at an equation called the economic order quantity that can help you choose a lot size by managing the trade off between the inventory holdings costs and replenishment costs. When we talk about the cost of holding inventory, there is several things we should include. For example, many businesses borrow money from a bank to finance their inventory. Then there's money wasted when inventory is lost, damaged or stolen. For replenishment costs, we need to include the time it takes for someone to issue a purchase order, and the cost for transportation and handling. Let's use an inventory chart to visualize the relationship between lot sizes, order frequency, and inventory levels. We start by receiving a shipment from our supplier. At this point our inventory level is equal to the lot size. As time goes by, we have steady sales. Eventually, we sell out all of our inventory and we want to replenish as soon as we sell the last item. This becomes a cycle of replenishment followed by sales. Notice that the average inventory level is exactly one half of our lot size. So let's look at what happens when we make our lot size smaller. If we choose a smaller lot size but don't change the order frequency, then we end up with stockouts, that's not a good option. So instead, we'll need to order more frequent replenishments. Now our inventory holding costs are lower but our replenishment costs are higher. The way to balance the inventory holding cost with the inventory replenishment cost is by calculating the economic order quantity or EOQ. The EOQ is the square root of two times your annual demand times your ordering cost divided by your inventory holding cost. Once you know the EOQ, then it's easy to figure out how often you need to place your orders and how many orders you'll need to place each year. If you use software to manage your supply chain, these calculations are probably happening automatically. The EOQ isn't always practical. So be prepared to round your actual order quantities up or down based on the lot sizes that are available from your suppliers. Finding the right balance between inventory holding cost and replenishment cost is one of the best ways to ensure you're making smart investments in your supply chain. And every dollar that you can save by using an economic order quantity is an extra dollar of profit that goes straight to your bottom line.

## Manage customer returns

- Most of us think about supply chains as a one-way street. We buy stuff from suppliers and we sell stuff to customers. But that flow gets reversed when products need to be returned. In this video, we'll talk about reverse supply chains and how managing them effectively can have a big impact on your costs, your revenues, and your customer service levels. There are three main reasons that a product might need to flow upstream in a supply chain. First, it could be an extra or unwanted product. Customers might buy the wrong item, buy more than they needed, or receive a gift that they didn't want. It could be defective or damaged. And customers sometimes return products when they're used up and at the end of their life, like when we return dead batteries or empty bottles. Regardless of the reason a product is being returned, when you manage a reverse supply chain, you need to keep five goals in mind. First, you want to minimize the cost of the entire process, including shipping, sorting, and processing. Next, you wanna maximize the value that you're able to recover from each product. Third, you wanna maximize customer satisfaction. Remember, the experience that customers have with your reverse supply chain can affect your brand and their loyalty to you. Of course, you also wanna minimize the waste in your reverse supply chain and focus on sustainability. And last but not least, your reverse supply chain needs to filter out counterfeit products, as well as products that have been altered or contaminated. Here are some of the steps that are used in many reverse supply chains. First is a return materials authorization, or RMA process. An RMA begins when a customer calls in to tell you that they're returning a product. By issuing an RMA, you can start tracking that product before it's even been return. So when it does arrive at your facility, you know exactly what it is and can quickly route it where it needs to go. Next is the inbound inspection process. When returned products arrive at your facility, you need a process for figuring out what they are and what you should do with them. Some returned products will go through a repair process. Afterwards, they might be returned to the customer or resold as being remanufactured. If the product still works, it might be resold through

a clearance center or through a discount channel. And if you determine that a product is unrepairable, then you may need to dispose of it through recycling or by sending it to a landfill. When you're looking for new ways to create value, take a look at your reverse supply chain. You might find opportunities to reduce costs, increase customer satisfaction, and improve the sustainability of your business, and those are accomplishments that every supply chain and operations manager can be proud of.

## Build a career in supply chain operations management

- Working in supply chains is fun. But the field is so broad that you need to make your own choices about where you want to go and how you're going to get there. Let's take a look at a range of jobs across the supply chain, and how you can navigate through them to create your own career. You can break most supply chain roles into three functions: purchasing, logistics and operations. For retail companies, operations involve running the stores. For manufacturing companies, operations involves running a factory. And for distribution companies, operations is basically the same thing as logistics. In each of these functions, there are career ladders. The first rung on the ladder are associates. The next rungs are supervisors, managers, directors and vice presidents. The top of the ladder will be a chief supply chain officer or a chief operations officer. The higher you go up these ladders, the more money you'll earn. But there are also fewer jobs near the top, so it becomes harder to advance. And the higher you go, the more important it is to understand how your function interacts with the other functions in the supply chain. So rather than climbing one ladder, it might be better to think about mapping your career with a matrix. Moving both horizontally and vertically will give you insights and credibility that make you a stronger candidate for senior roles. While some of the skills required on each career ladder are unique to that function, others are equally valuable on all of them. For example, knowing how to use spreadsheets and analyze data is a critical skillset on all three ladders, and so are project management and leadership. Where can you get the skills to be successful in a supply chain career? Well, of course this site is a great resource. You can check out my courses as well as the

courses by Eddie Davila, Steven Brown and others. You can earn a certificate or a degree from a community college or university, or sign up for advanced online programs like MIT's MicroMasters in Supply Chain Management. You can also get certified by all of these professional associations. They provide certifications for supply chain professionals. And don't forget about hands-on experience. You can get experience through a job, but you can also get it by volunteering with non-profit organizations. No matter where you are on your professional journey, there are lots of career opportunities in logistics, procurement and operations. Keep honing your skills and seeking out practical experience, and you can have a very rewarding career as a supply chain professional.

## Ten industries for supply chain operations managers

- One way to protect yourself form the ups and downs of the economy is to build a flexible career. So in this video we'll look at how supply chain professionals can add value in number of very different industries. Technology companies make hardware and software and they have supply chains. Hardware companies buy parts, software companies buy computers. In addition to the physical supply chains, digital supply chains are very important to tech companies. Supply chain folks can also work in professional services as consultants or analysts. Consultants work with companies to make improvements and analysts look across an industry studying trends. Financial companies like banks and insurers need to manage a supply chain that includes all of the equipment and computers in their offices. Government supply chains are enormous. Every government department, every school, and every non profit has a supply chain. There's been a growing need for supply chain management in healthcare and pharmaceuticals. Medicines need to be kept a specific temperatures and expire if they sit around for too long. In a hospital, the supply chain insures that all of the equipment that the doctors and nurses need is available. The oil and energy industry employs supply chain professionals all around the world. They support drilling, distribution, and refining and they ship products using virtually every mode of transportation. Retail stores depend on

supply chain professionals to optimize their inventory and transportation processes. They often need to pay special attention to the impact of promotions and the ups and downs of fashion. Communications companies are built with lots of electronics and cabling. Managing those supply chains well is essential for keeping our internet and cellphone infrastructure working. The companies that manufacture things like cars, tractors, and airplanes, deal with a huge number of different parts. In addition to their manufacturing supply chains, these companies also have supply chains for service parts to keep their equipment running and working as a temporary employee through a staffing firm can be a good way to see many different companies from the inside and it can lead to longer term opportunities. The truth is there are supply chains in every industry. If you focus on developing your expertise as a supply chain professional you'll be an attractive candidate for many different roles. So no matter how your company is doing today it's a good idea to keep your skills sharp. That way you can be confident you'll have lots of opportunities to work with companies that really value what you bring to the table.

## Recruit top talent successfully

- Supply chains aren't just about processes and technology, they're also about people. And recruiting the right talent can be one of the toughest challenges a supply chain manager will face. So, I'm going to share some strategies that can help you attract the talent you really need. Let's start by using a total cost approach to think about the investment you're making in the folks you hire. There are five main drivers of cost when it comes to supply chain talent. There's urgency. The more you need an employee, the more you'll end up spending to recruit them. There's the labor market. In order to get people on your team, you need to offer competitive compensation and benefits. There's geography. If the people you need don't live where you need them, then you'll have to pay for travel or relocation. Fourth is competency. If the people you hire don't have all the skills they need for the job, then you'll have to pay to get them trained. And the fifth driver of cost is the opportunity cost from all of the work that doesn't get done or that gets done poorly when you don't have the people you need on your team. So, when you add all of

those costs together, you can make a pretty strong business case for the value of effective recruiting. I tend to think of recruiting as the beginning of your supply chain for talent. And keep in mind that if you don't have enough people to do the work, an even heavier burden falls to the folks that you do have. And when people are overworked, there's an increased risk that they'll leave, which adds additional costs. So, like any supply chain, the first step is to try to forecast your demand. I recommend using an approach called strategic workforce planning. Once you have a forecast, you can think about the best places to find the people you need. Look for ways to support high schools, community colleges, universities, and professional associations. By offering guest speakers, providing tours, and sponsoring corporate events, your company gets a chance to meet your future employees in an informal setting. Another valuable tool is social media. Build a presence on platforms like LinkedIn, where candidates can engage with you. The network effect can help you to spread the word when you post job openings. And get to know some talent search professionals who really understand your business. Great leaders focus on building great teams. If you think it'll be easy to find the talent you need, then investing in a recruiting strategy might not be necessary. But if you're in a competitive labor market, then using these tips to develop a talent pipeline can pay big dividends and make a big difference for your whole supply chain.

## Solve problems as a team

- A good team is the best tool for overcoming big challenges. But just because you have a group of people working together, doesn't mean they're working effectively as a team. Here are a few tips that can lead to better results, when you need to collaborate with colleagues to solve supply chain problems. First, make people feel safe. Psychological safety is one of the key building blocks for building effective teams. No matter what happens, people need to feel like they'll be okay. Next, focus on the problem, not the person. Make sure that everyone understands that blame is irrelevant, and when we find a solution, make sure everyone gets credit. Expect and encourage people to take personal accountability for specific tasks. When everyone is accountable for getting something done, then no one is really accountable for it. Be

mindful of everyone's minutes. If there are three people in a meeting, then you're consuming three people's time. Make sure that you're using that time well. As a leader, when you're dealing with challenges, help your team break big problems down into smaller, manageable chunks. Once they understand your goals, and the available options, it's easier to come up with a plan. And finally, create a rhythm that aligns with your plan, and schedule time for updates. Make sure that everyone has a clear understanding of what they're supposed to be working on right now, and when it needs to be finished. If you're looking for a deeper dive on team leadership, check out Todd Dewett's course *Managing Teams*. I also recommend the book *The Five Dysfunctions of a Team*, by Patrick Lencioni, which can be a great way to help everyone on the team see how their own behaviors are impacting the performance of others. Supply chain teams run into new challenges every day. If your team works well together, solving problems actually becomes a lot of fun. And being an effective team leader could be the key to your long-term success in supply chain and operations management.

## Beware of the bullwhip effect

- What fascinates me about supply chains is that they're actually complex systems. And one of the most interesting dynamics that occurs in these systems is a phenomenon called the bullwhip effect. It's a pattern that can cause huge swings in your inventory, making it feel like you're riding a supply chain rollercoaster. Let's see what causes the bullwhip effect, and how you can protect yourself from it using some simple supply chain management strategies. In a perfect world, customers would always buy the same amount of product on a regular schedule. That would lead to a stable demand pattern throughout the entire supply chain. But in the real world, customer orders are unpredictable. The bullwhip effect occurs because demand signals often get amplified as they're passed up the supply chain. So any variation in the orders from a customer creates larger variations in each upstream step. The result can be a stock out of products in one place, while another part of the supply chain is drowning in inventory. Here are three specific things that you can do to control the bullwhip effect in your supply chain. First, reduce uncertainty by sharing information with your supply chain



partners. The more information your suppliers can see about what your customers are buying, the easier it is for them to help you meet that demand efficiently. You might also share information about your suppliers with your customers. Transparency reduces the temptation for everyone to game the system. Next, reduce your lot sizes. An ideal situation is a pole supply chain, where a customer order triggers an immediate replenishment. But that's often not practical when you have to move products over a long distance, or when you have to manage production constraints. So choose the smallest lot sizes that are practical for each of your products. And the last thing you can do is to manage promotions. Promotions can be a great way to increase sales and attract new customers. But they also drive unpredictable variability in demand. If you're going to run promotions, then that information needs to factor in to your forecasting and your replenishment planning. If you're interested in learning more about the bullwhip effect, one of the best explanations is an article from Stanford University professor Hau Lee. It was published in MIT Sloan Management Review. The bullwhip effect is a pattern that emerges in all kinds of supply chain systems. Understanding what it is and how you can control it is a critical capability that will help you manage your supply chain successfully.

## Make your professional development plan

- What do you get if you combine contextual knowledge, subject matter expertise, and a strong professional network? You get a supply chain manager with stellar career prospects. So let me introduce you to the professional development dashboard I use to coach my teams and to guide my own development. Let's break professional development goals into three categories, contextual knowledge, subject matter expertise, and your professional network. Contextual knowledge is your understanding of what's happening around you. This starts with understanding the general environment, and being familiar with current events. You can build your knowledge of the business environment with resources like Harvard Business Review, the Wall Street Journal, and CNBC. You also need to understand what's happening in and around your organization. That means knowing your strategic objectives and who your competitors are. Finally, you need to know

what's happening in your department, and the projects and programs you're working on. Subject matter expertise is your knowledge of your profession. For supply chain professionals, that can include tools like supply chain information systems. You also need to understand the rules of our profession, like industry regulations, customs requirements, and Incoterms. And in order to communicate with one another, we need to share a common language. Knowing the jargon helps you collaborate more effectively. Some of the best ways to build subject matter expertise are by reading, taking courses, and earning professional certifications. The last area for development is your professional network. The first group of people you need to pull into your network are your peers, the people who are horizontal to you in the organizational chart. You also need to build relationships with people at other levels in the organization. If you're a manager, this includes the people who report to you, but it also means you need to connect with the people you report to and their bosses. Last but not least, you should build relationships with professionals outside of your company. In my experience, the best way for supply chain professionals to network outside of their organization is by getting involved in professional associations. All of them have local meetings and large conferences where you can meet lots of people in a short period of time. Building a career is an ongoing journey, so you need to have a plan to keep yourself on track. By focusing on building your knowledge of the environment, growing your subject matter expertise, and expanding your network, you can be sure that you'll be staying current with the changes that are happening around you. And you'll be prepared to take advantage of opportunities along the way.

### Adopt formal purchasing ethics

- If you track news headlines, it's amazing how ethical scandals around the world can lead to supply chain crises. Let me show you how formalizing purchasing ethics can protect your company and keep it from becoming one of those headlines. A business makes money by converting input, like raw materials, into output, their finished products. We tend to define businesses by their output, but it's also important to think about the input and how companies procure the goods and services in their supply chain. When

looking at input, leaders naturally focus on ways to lower costs but cost isn't the only thing that matters. By embracing an ethical purchasing approach, you can create additional value for your company. For example, ethical purchasing leads to improved quality, it can reduce the risk of counterfeiting and ensure the safety and reliability of the inputs you buy. Another benefit is sustainability and social responsibility. Purchasing ethics can help you avoid situations that could cause environmental harm or result in the exploitation of workers. And, a third benefit is legal risk. Purchasing ethics can help ensure that your company isn't breaking laws that could result in fines, penalties, legal costs, and even jail time for your employees. So, what are some of the issues that your purchasing ethics policy should address? Let's start with transparency and confidentiality. You should be as transparent as you can with your suppliers but you also need to protect confidential information for your company, and confidential information that your suppliers share with you. Obviously, no company should tolerate corruption, such as bribes, and they need to avoid conflicts of interest, where decisions are made for reasons other than the best interest of the firm. Supply chains are ripe with opportunities for accidents, so purchasing ethics should address how you handle your supplier's mistakes. You should also address discrimination and how you encourage diversity in your supply chain. This includes how your suppliers manage their employees and handle issues, such as wages, working hours, working conditions, employee choice, and child labor. Finally, you should be explicit about the need to comply with the laws of the places in which you do business. Writing a policy for purchasing ethics doesn't need to be hard. Two of the best resources I've found are the Chartered Institute of Purchasing & Supply in the United Kingdom, and the Institute for Supply Management in the United States. Both have research, training, and tools that can help you create and implement your own purchasing ethics policy. A good policy on purchasing ethics will lower your risk for expensive problems and can go a long way toward building trust in your brand, so having a formal purchasing ethics policy and creating an ethical procurement culture are important steps in building a stronger, more sustainable supply chain.

**Learn about supplier relationship management (SRM)**

- Every business depends on their suppliers. Making sure you can get the products and services you need, on time, and for the right price is a critical part of managing a supply chain. In this video, we'll talk about supplier relationship management. And I'll show you how segmentation can help you manage supplier relationships, more effectively. Any time you separate your suppliers into groups that have similar characteristics, it's called segmentation. There are lots of ways to segment suppliers. But for this video, we'll analyze two characteristics. The amount of money you spend with the supplier and the switching cost to change suppliers. The amount of money you spend is, generally, pretty easy to find. But switching cost might be more subjective. Because it has to account for things like whether you have a big investment in shared technology and processes. Now, let's use these two characteristics to place suppliers into four segments. Commodity, standard, strategic, and key. With commodity suppliers, you spend lots of money, but there are plenty of alternatives and it's easy to switch between them. The goal for these relationships is to make sure you're getting materials reliably and for the lowest cost over the long term. For standard suppliers, you don't spend a lot of money and it's easy to switch to a different supplier. So, your goal here should be relationships that are flexible and easy to manage. With key suppliers, you may not spend a lot of money, but it's hard to switch. So, it's really important to have strong communication and a lot of collaboration. You're very dependent on them, but since you don't spend a lot of money you could be cut off if they have capacity limitations. Finally, strategic suppliers are the ones you buy a lot from and that are hard to switch away from. For strategic suppliers, you need to have very close relationships. In fact, it often makes sense to form a joint venture with your strategic suppliers. In order to ensure that your interests stay totally aligned. Supplier segmentation is a key step in the strategic management of your supply chain. Once you understand the goals for each supplier relationship, you can translate those goals into metrics and track each supplier's performance on a score card. And you can roll up the data from those score cards into a supplier dashboard so that you have top to bottom visibility of how all of your suppliers, in each segment are performing. We all depend on suppliers for our own success. Segmentation is a powerful tool for

defining your supplier relationship goals. And it's a building block for creating a stronger, more effective supply chain.

## Use analytics for supply chain

- Supply chain analytics is a hot topic and one that's full of buzzwords. So it's easy to get confused when people talk about descriptive, predictive, and prescriptive analytics. But understanding the differences between them can help you make better choices about the tools and the skills that you really need to move your supply chain forward. Let's look at three kinds of questions that supply chain managers often need to answer. Then we can see how analytics can help with each of them. The first kind of question we often face is what happened in the past. When we answer questions about the past, we use descriptive analytics. Descriptive analytics involve structuring and filtering data and then looking for patterns. For example, you could use descriptive analytics to look backwards and determine the impact of a promotion or to calculate the savings from a project. The second kind of question we often need to answer is what will happen in the future. To answer these questions, we build on descriptive analytics to create forecasts. This is called predictive analytics. You'd use predictive analytics to do things like estimating the sales of a new product or forecasting the price of transportation. The third kind of question we often have to answer is what should we do and to answer those questions, we need a different approach called prescriptive analytics. Prescriptive analytics basically involves looking at lots of different scenarios and then making a recommendation and prescribing the best course of action. For example, prescriptive analytics could involve monitoring weather forecasts and then telling us which port to route a shipment through in order to minimize the threat of a disruption. Prescriptive analytics often involves creating models and running simulations. It's also one of the common uses for artificial intelligence. Knowing that we have these three different approaches to analytics, the question you should ask is what kind of analytics should I use. The answer depends on the improvements that you're trying to drive in your supply chain. It often helps to create a matrix like this one that maps your technologies to your goals. For example, if you're trying to reduce

costs, increase revenues, and lower risk, then you can use this chart to show where each analytics project and each analytics tool fits in. You might have a project to improve forecasting accuracy. That would help you increase revenues and decrease costs. And a new supply chain control tower could be designed to lower your risk using prescriptive analytics. For a deeper dive and some hands on practice with analytics, [check out John Johnson's course](#) Data Analytics for Business Professionals. When you structure and filter your data correctly, you'll uncover trends and patterns that lead to important insights about your supply chain. Descriptive, predictive, and prescriptive analytics are three different approaches that can help you answer important business questions and most of all, if you use them correctly, each of these approaches can help you make better supply chain decisions.

## Learn about warehouse management systems (WMSs)

- [Many people take warehouses](#) and distribution centers for granted, but they're not just big buildings where we store boxes. These facilities often house millions of dollars worth of inventory and they employ a large percentage of a company's workforce. So using technology to manage them efficiently is actually a critical part of optimizing your supply chain. In this video we'll talk about warehouse management systems, special computer programs that are designed to help you manage the processes in a distribution facility. A warehouse management system, or WMS, should help you keep track of four things. First, the products that you're handling. In a distribution center each product is called a stock keeping unit, or SKU. Each SKU has its own attributes, like size and weight. Some SKUs also require special handling. For example, they might contain hazardous materials or they might need to be refrigerated. You also need to keep track of your inventory storage locations. These are the spots throughout a warehouse where you can store products. A location could be a spot on the floor or it could be a particular shelf on a rack. You need to match the attributes of your SKUs to the attributes of your storage locations. And that's a process we call slotting. Then you need to track the loading dock doors for your warehouse. Usually you'll have one set of dock doors for your inbound deliveries and a separate set of doors for outbound shipments. But in smaller

facilities you sometimes need to use the same doors for inbound and outbound. And finally, you need to keep track of your people and their productivity. You have to understand how long it takes to do the work in a warehouse in order to plan to have the right number of people to do it. Another important inventory location that's sometimes overlooked is the parking lot or the trailer yard outside. Inventory can sit on trailers waiting to be received, or it can sit there loaded waiting to be picked up. There are also situations where overflow inventory can actually be stored on trailers in the yard rather than storing it inside the warehouse. In order to have full visibility to your inventory you need to have some way to see these trailers, either inside of your WMS or with a separate program called a yard management system. A great resource for keeping up with trends in warehouse management is the Warehouse Education and Research Council or WERC. They run an annual benchmarking study that can help you compare your facility's performance to other companies. Choosing the right WMS and configuring it correctly can give you better inventory visibility and tighter control of the distribution facilities in your supply chain. And the insights in metrics from your warehouse management system can help you drive improvements and manage your whole supply chain more effectively.

### Learn about transportation management systems (TMSs)

- For many companies logistics makes up 10% of their costs and transportation is a big part of that. Using a transportation management system, or TMS, can help you manage those costs more effectively. When you think about managing transportation picture your supply chain in terms of three links. The first link is your Inbound Material. That's all of the products that your suppliers are shipping to you. The second link is your Internal Logistics. Where you move products around between your own factories distribution centers and stores. And the third link is Outbound Materials. Things that you're shipping to your customers. Companies can use a TMS to manage the flow of inbound and outbound materials. They might use the same TMS for both, but not necessarily. The TMS managing your Inbound Transportation helps you see which shipments have come from which suppliers and what production orders their intended to fill. The TMS

managing your Outbound Transportation can tie shipments to customer orders and production schedules. TMS's can help with planning for the future and with executing daily operations. And they can help you track capacity utilization, optimize your distribution network, and negotiate better rates. For example, the data from your TMS can help you combine several small lanes into a single larger lane so that you can get a better price from your carriers. When it comes to transportation execution, a TMS uses a document called a Routing Guide to provide instructions for how to ship each load based on the current agreements you have in place with carriers. If you need to ship a 20 thousand pound load from Anchorage to Albany the Routing Guide might instruct you to use one carrier. But, to ship a 10 pound load from Miami to Minneapolis you'd use another. Some TMS's can even tender loads automatically and then track the shipments while they're in transit. Choosing the right TMS and using it correctly can help you reduce costs and increase efficiency. And there's another benefit that's important to all of us. By improving the efficiency of our transportation processes we automatically improve the environmental sustainability of our supply chains. Transportation is an important part of logistics in supply chain operations. TMS's are a great example of how we can use the power of technology to lower costs, increase efficiency, and drive real improvements in today's supply chains.