

# Chapters *To Go*



## Essentials of Inventory Management, Second Edition

by Max Muller  
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## Chapter 7: Basics of Supply Chain Risk Management

Supply Chain Management (SCM) is a set of procedures and protocols utilized to integrate suppliers and their suppliers, manufacturers, warehouses, and retail stores to enable merchandise to be produced and distributed with the right quality, in the right quantities, to the right locations, at the right times, in order *to eliminate or minimize system-wide costs, while satisfying service-level requirements*.

Supply Chain Risk Management (SCRM) deals with the risks associated with supply chains that may stretch from Tasmania to Tacoma.

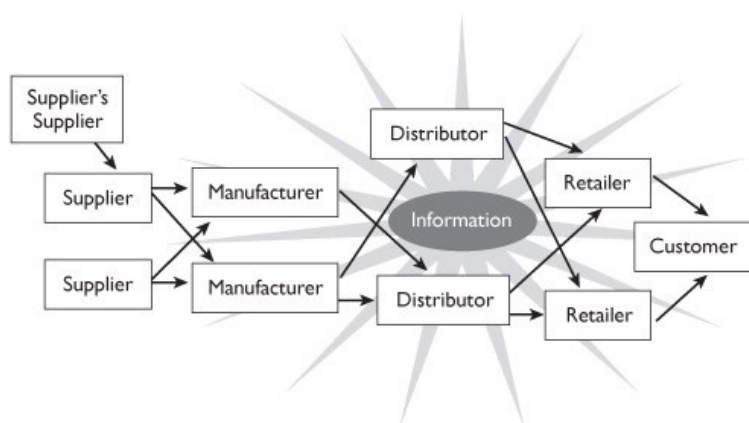
The objective of this chapter is to identify and address some of the significant risks associated with SCM.

### SCM in a Perfect World

In a perfect world (which, of course, does not exist), SCM would be the ultimate application of JIT/ERP—one in which all parties would flow inventory to and through one another with no waste. (See Chapter 5.) SCM is the next step beyond JIT/ERP concepts that are employed only within a limited number of transaction participants. It seeks to apply JIT/ERP concepts to the entire supply chain—from end to end.

Stockkeepers, especially in the manufacturing environment, have steadily moved toward SCM. See [Exhibit 7-1](#).

### Exhibit 7-1: Supply Chain Management



In SCM, using appropriate software, users have 360-degree information visibility across the entire supply chain network. This allows them to monitor the status of mission-critical activities across all suppliers, production plants, storage facilities, and distribution centers.

Samuel Slater, popularly known as the “Father of the American Industrial Revolution,” or the “Father of the American Factory System,” established the first successful American cotton mill at Pawtucket, Rhode Island in 1793. Before the end of the eighteenth century, Eli Whitney, the inventor of the cotton gin, dramatically affected the industrial development of the United States when, in manufacturing muskets for the government, he developed the American mass-production concept of semiskilled workers using patterns, templates, and jigs to produce identical, interchangeable parts. Suddenly there was a need to have the right item in the right quantity. Enter risk.

In a perfect world, a manufacturing business buys stuff (raw materials), turns the stuff into something of greater value (the product), and sells it for a higher price. And, it accomplishes all that while only buying and producing the item when the customer wants it. In other words, it always accurately forecasts both requirements and demand. The risks are not receiving what you need when you need it or buying and receiving what you thought you needed, but didn’t.

Throughout the Industrial Revolution and for many years after, the lack of transportation, communications, and information management systems limited the amount of coordination and risk reduction achievable among suppliers, manufacturers, distributors, and end users. It was not until the early 1960s, when Joseph Orlicky, an engineer working with IBM, introduced the concept of Materials Requirements Planning (MRP), that some of the risks inherent in an ever-expanding supply chain were first addressed. Conceptually, MRP is a terrific idea. Product demand is linked to raw material supply,

and a computer does the calculations, allowing you to only buy what is required at the latest possible opportunity, while ensuring that the customer forecast is met in its entirety. MRP enables you to carry less working and safety stock, resulting in significantly increased profitability. (See Chapter 5.) But it doesn't eliminate risk. By allowing for less safety stock, MRP actually increases risk. This is especially true today as globalization has stretched supply chains around the planet. If natural disasters, political upheaval, or terrorist actions prevent goods from reaching you and you lack sufficient buffer stock to carry you until the next delivery, the negative impacts are obvious.

The advent of JIT/Lean manufacturing systems in the 1980s further increased supply chain risks. With JIT there is no safety stock. There is an increased reliance on single-source suppliers. There is no margin of error for tainted, damaged, or otherwise unsuitable materials. If things go wrong, they go wrong dramatically.

It's not a perfect world.

## Primary Risks in SCM

The primary risks associated with SCM are discussed in the following sections.

### Globalization and Supply Chain Complexity

Your supply chain runs end-to-end—from point-of-origin to end use. Since there are so many organizations involved, from local concerns to international enterprises, you are only able to exert influence over limited parts of it (unless your organization is extremely large and influential). Therefore, a major risk inherent in most supply chains is simply the lack of control you have over most of the forces driving it.

During the 1920s, organizations attempted to control supply chain risks through vertical integration. In other words, companies tried to control as many aspects of the supply chain as possible “in-house.” Organizations tried to control their supply chain risks by carefully locating their facilities in safe locations (away from areas prone to floods) and close to supply points, controlling how their facilities were operated, and carrying larger quantities of safety stock. Basically, this was a “self-contained” approach.

One of the more dramatic examples of this was the production facility at the Ford Motor Company Rouge River plant in Dearborn, Michigan. Raw materials from Ford-owned mines arrived on Ford-owned freighters. Many other raw components came from Ford-owned forests, glassworks, and a rubber plantation in Brazil. Much of this was delivered on Ford-owned rail lines. (It is interesting to note that the modern Ford Motor Company, with a diverse, outsourced supply chain, had to shut five of its plants when it couldn't get enough parts from its suppliers in Canada because of reinforced security at the borders in the days that followed the 9/11 attack on the World Trade Center.)

When companies began to internationalize in the late 1950s and early 1960s—that is, to serve foreign markets through facilities in those countries—they merely took the self-contained model with them.

Globalization during the 1980s changed much of what had gone before. With globalization, companies sought out the lowest cost materials and labor throughout the planet. This global search for the lowest manufacturing costs coincided with many manufacturing enterprises following the JIT concepts brought to America by Toyota Motor Corporation. They began to embrace just-in-time inventory levels, single-source suppliers, and lean manufacturing techniques that reduced operating redundancies. Sales and distribution facilities were separated (decentralized) from manufacturing facilities and sited so as to serve specific customers, regions, or countries. In-house capabilities and expertise gave way to outsourcing of noncore functions. Just as companies began to operate with lower levels of safety stock, less centralization and control over operations, and less internal versatility, they began to increase their risks to many *single points of failure*.

A single point of failure within a supply chain causes the entire system to stop working. The volcanic ash that prevents airfreight from moving to or from Europe, the Melamine-tainted product from a single-source supplier that provides the item to thousands of distributors around the world, the act of terrorism or change in political dynamics that chokes off supply or causes uncertainty and wild fluctuations in delivery times throughout the supply chain can cause irreparable harm to a company that isn't practicing SCRM.

Although single points of failure are the most dramatic causes of supply chain system failures, a series of relatively small disruptions in a long supply chain can together result in a catastrophic failure as well.

### Conflicting Interests

Various entities within the supply chain have different, and often conflicting, objectives. For example:

- Raw materials and subassembly suppliers want manufacturers to commit to purchasing large quantities, in stable volumes, with flexible delivery dates. Although manufacturers desire long-term commitments from their suppliers with the lowest volume discounts possible and the highest service levels, they are fearful of overcommitting in the face of customer demand fluctuations. Suppliers want stability while manufacturers want flexibility.
- Manufacturers want to reduce their acquisition and production costs by engaging in large production runs. However, that set of goals is in direct conflict with the objectives of both warehouses and distribution centers, which is to reduce inventory levels. Making this even worse is that in reducing their levels of inventory on hand, warehouses and distribution centers have to bring in smaller quantities more often, which increases purchasing and transportation costs.
- A large end user may want to buy four of a nonstandard pack size that the distributor can only buy in minimum quantities of six. The distributor doesn't want to lose the customer, but has no use for the additional two items. If the end user won't buy them, but the distributor must acquire them (and can't charge the customer for them), they will become dead stock. See Chapter 2 for a discussion of obsolete and dead stock.

**System Fluctuations Over Time**

Even when an organization is using sophisticated forecasting software or when demand is known because of contractual agreements, SCRM must take into consideration changes in demand and costs, such as seasonal fluctuations, trends, back orders, equipment failures, advertising and promotions, and competitors' pricing strategies.

In addition, as a supply chain grows longer and more geographically diverse, delivery lead times, manufacturing yields, natural and human-made disasters, and the like become real areas of concern. For instance, as replenishment lead time from a supplier grows or if the supplier is unreliable, the buyer must have more safety stock on hand to protect itself from stockouts.

Even with the most sophisticated forecasting techniques, forecasts for a specific item or group of items are often incorrect.

**Evolving Relationships**

A supply chain is organic. It grows, expands, and contracts. Relationships evolve and change. Spheres of influence evolve and change.

Establishing a closer relationship with a supplier can lead to more predictability as well as to lower costs and better efficiencies, while an increase in a specific customer's power may cause pressure to change suppliers or the items and quantities being acquired.

**Product Complexity**

The more complex a product is to manufacture, the greater the skill set and mechanisms needed to create it. Fewer suppliers for these items exist and, therefore, there is consolidation into fewer or single sources. And, the more complex it is, the more it costs to create.

Outsourcing the creation of complex items adds more exposure and single points of failure to your supply chain.

**Inadequacy of Insurance**

What is your risk of loss? Quite simply, do you know what you are trying to insure?

Your company can be insured against many risks, but the real risk is not recognizing what your risks are. For example, your terms of sale and/or your purchase terms with *each* supplier or customer will determine when title to the goods transfers, and when the risk of loss attaches. See [Exhibit 7–2](#). You must ensure that a cargo insurance policy insures your goods for all transit exposures, both internationally and domestically, and by any conveyance mode.

**Exhibit 7-2: Freight Terms—Free On Board (FOB)**

Terms of Sale	Responsibility for Freight Cost and Transit Risk
F.O.B. Destination, freight prepaid	Seller - Pays freight charges Seller - Bears freight charges Seller - Owns goods in transit

	Seller - Files claims (if any)
F.O.B. Destination, freight collect	Buyer - Pays freight charges Buyer - Bears freight charges Seller - Owns goods in transit Seller - Files claims (if any)
F.O.B. Destination, freight collect and allowed	Buyer - Pays freight charges and deducts from invoice Seller - Bears freight charges Seller - Owns goods in transit Seller - Files claims (if any)
F.O.B. Origin, freight prepaid	Seller - Pays freight charges Seller - Bears freight charges Buyer - Owns goods in transit Buyer - Files claims (if any)
F.O.B. Origin, freight collect	Buyer - Pays freight charges Buyer - Bears freight charges Buyer - Owns goods in transit Buyer - Files claims (if any)
F.O.B. Origin, freight prepaid and charged back	Seller - Pays freight charges and adds to invoice Buyer - Bears freight charges Buyer - Owns goods in transit Buyer - Files claims (if any)
F.O.B. Destination, freight prepaid and charged back	Seller - Pays freight charges and adds to invoice Buyer - Bears freight charges Seller - Owns goods in transit Seller - Files claims (if any)
Special	Buyer - varies Seller - varies (specifications indicated in body of Purchase Order or as an attachment to the Purchase Order)
Pick Up/Will Call	Buyer - Bears freight charges Buyer - Owns goods in transit

In addition to freight terms, your supply chain includes other insurable risks, such as storage/warehouse exposure, consolidation exposure, staging exposure, processing exposure, and fulfillment exposure.

Unfortunately, even adequate dollar amounts of insurance coverage cannot protect you from many of the significant negative impacts of supply chain, such as loss of reputation, customers who seek other suppliers, and higher costs of capital in the future.

Insurance should be your last line of defense, not your first.

## Suppliers

Reducing the number of suppliers an entity uses is one of the core ideas behind JIT/Lean manufacturing. To reduce purchasing costs and gain better control over lead times and quality, firms adopting JIT/Lean manufacturing have gone to single-source suppliers or *tiering*. Tiering is where a supplier network is arranged so that the manufacturer deals with a limited number of “main suppliers.”

Certainly there are many benefits to single sourcing. See [Exhibit 7–3](#). However, the economic and control benefits of single sourcing must be compared to the increased supply chain risks that arise from a loss of flexibility when a single-source critical item supplier or a small group of suppliers fail in whole or in part.

### Exhibit 7-3: Comparative Benefits of Single Sourcing versus Multiple Sourcing

Single Sourcing	Multiple Sourcing
<ul style="list-style-type: none"> <li>■ A larger customer can gain more control over the entire purchasing process (e.g., sourcing, processing, expediting, inspection, billing, and payment terms)</li> <li>■ Can reduce purchasing costs (e.g., the R factor). See Chapter 2.</li> <li>■ Better discounts at higher volume purchases</li> <li>■ Able to demand better quality</li> <li>■ Able to demand changes in packing (which leads to more cost-effective modes of transportation and handling)</li> <li>■ Priority availability of items when supplier must favor one customer over another if quantities cannot cover all orders</li> <li>■ Reduction of inventory based on trusted relationship and lead times</li> <li>■ Better, more timely information</li> <li>■ Working with suppliers that are both financially and operationally robust (e.g., more than one manufacturing plant for the desired items).</li> </ul>	<ul style="list-style-type: none"> <li>■ Reduce risk of item unavailability by having alternative sources of supply</li> <li>■ Maintain competition</li> <li>■ Stay in touch with the market (e.g., pricing, new products, trends)</li> <li>■ Avoid complacency (e.g., being taken for granted, poor customer service on the part of a single-source critical item supplier)</li> </ul>

Even when multisourcing items, there are risks.

If you use two separate suppliers for the same items, but both are in the same foreign country that is known to have large-scale natural disasters, political instability, unreliable legal systems, or significant terrorist attacks on infrastructure (such as transportation or communications systems), then what will cause one to fail will almost certainly dramatically impact the other. The same risks arise in using multiple suppliers that ship through the same carriers, docks, and the like.

There is certainly nothing wrong with seeking low-cost suppliers around the globe. However, you must factor in the attendant risks when outsourcing to low-developed, high-exposure countries.

### The Bullwhip Effect

In unmanaged supply chains, as transactions move back through the supply chain away from the retail customer, demand variability increases, and small changes in consumer demand can result in large fluctuations in orders placed upstream. Eventually, the network experiences very large swings, as each organization in the supply chain seeks to solve the problem from its own perspective. This phenomenon is known as the *bullwhip effect*.

The following can all contribute to the bullwhip effect:

- Overreaction to backlogs
- Holding back purchase orders to reduce inventory
- Lack of communication up and down the supply chain
- No coordination up and down the supply chain
- Delay times for information and material flow
- Order batching into larger quantities

Order batching occurs in an effort to:

- Reduce ordering costs.
- Take advantage of transportation economics such as full truckload economies.
- Benefit from sales incentives. Promotions often result in forward buying to benefit more from the lower prices.



- **Hortage gaming**, such as customers ordering more than they need during a period of short supply, hoping that the partial shipments they receive will be sufficient for their real needs.
- **Demand forecast inaccuracies** by each supply chain participant.

Basically, variability coupled with time delays in the transmission of information up the supply chain and time delays in manufacturing and shipping goods down the supply chain create the bullwhip effect.

**Disruption in Communications**

Information is at the very heart and soul of SCM. Without information, it is impossible to effectively coordinate activities within a supply chain.

Disruptions of communications, whether due to internal or external factors, are a major supply chain risk.

**Inadequate Software**

Inadequate information technology (IT) capabilities are a major supply chain risk. Having too much unstructured information is as bad as having too little or no information. Both will prevent you from preventing, mitigating, and reacting to supply chain risks.

Software used in SCM seeks to pull together all of the information required for major components within a supply chain. Its functions include:

▪ <i>Planning</i>	This is the strategic portion of SCM. Strategic level decisions impact the organization on a long-term basis. They deal with such issues as the near- and long-term goals of the entity, the number, and the location and capacity of its facilities—such as offices, warehouses, manufacturing plants, etc.,—or they may deal with if or how the organization will approach the entire supply chain management concept.
▪ <i>Sourcing</i>	Organizations must choose suppliers to deliver the goods and services they need to create their product. It is important to develop a set of pricing, delivery, and payment processes with suppliers and create metrics for monitoring and improving the relationships.
▪ <i>Making or Buying</i>	In manufacturing enterprises, supply chain managers schedule the activities necessary for production, testing, packaging, and preparation for delivery. In distribution, this is the intake of customer orders and acquiring the product necessary for order fulfillment. Forecasting future inventory needs is an essential element of this portion of SCM. See Chapter 5.
▪ <i>Delivery</i>	Delivery involves all of the logistics of coordinating the receipt of orders from customers, developing a network of warehouses, picking carriers to get products to customers, and setting up an invoicing system to receive payments.
▪ <i>Return</i>	Supply chain planners have to create a responsive and flexible network for receiving defective and excess products back from customers or other end users and supporting customers or end users who have problems with delivered products.

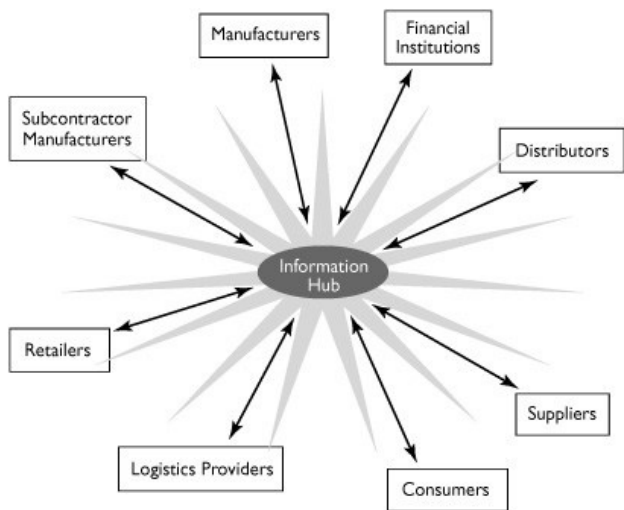
Each of the major supply chain steps above is made up of dozens of specific tasks, many of which have their own specific software. Some SCM software vendors have assembled many of these different chunks of software together under a single roof, but no one package is right for everyone. It is imperative that in selecting a package for your organization you seek out software that reflects the requirements of your particular industry.

SCM software that interfaces your information with other entities is highly dependent on information and data related to your specific organization. That kind of information is found inside enterprise resource planning software. See Chapter 5. It may also be found in legacy systems, such as collections of Excel spreadsheets scattered throughout an organization’s departments.

The Internet has provided the platform for a number of software developers to offer “information hubs.” See [Exhibit 7–4](#).

**Exhibit 7-4: Information Hub**

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Generally, information hubs are Internet-based, private company–hosted software packages with architecture that allows your company to share important information with your suppliers and customers electronically, in real time, thereby enabling them to work faster, smarter, and more cost effectively.

These hosted and managed services are not ERP systems. They are information enablers that takes the processes and information systems that already exist within your organization and makes them available, in real time, to your customers and suppliers via an electronic interface.

You own the data, decide exactly what data is made available, and who is authorized to receive it. Information hubs merely deliver the information.

The real risk to a supply chain with regard to IT isn't so much that appropriate software and hardware isn't available, but that organizations fail to appreciate how much time, money, and effort must be devoted to IT implementation. Implementing effective IT solutions to supply chain risks always (not sometimes) requires changes in operating processes, changes in corporate culture, and unrelenting, persistent effort.

Suggested Solutions to SCM Problems

The famous quotation by Charles F. Kettering, “A problem well stated is a problem half solved,” captures the approach any business must take when undertaking SCRM. To prevent, mitigate, and react to supply chain risks it is essential that you begin by analyzing the risks and determining which must be addressed immediately and in the near term.

Analysis of Risks

It is often useful to use charts and graphs to assist you in analyzing supply chain risks.

One approach is to create a Risk and Business Disruption Assessment Chart. See Exhibit 7–5. This approach sets up a spreadsheet. The Assessment can be of the entire supply chain or individual elements within it. For example, you could assess risks associated with each individual supplier, all suppliers within a given geographic area, all suppliers of critical items, your own facilities, etc.

Exhibit 7-5: Risk and Business Disruption Assessment Chart

Category	Type of Emergency		Probability		x	Frequency		x	Human Impact		x	Property Impact		x	Supply Chain Impact	
	High	Low	High	Low		High	Low		High	Low		High	Low		High	Low
	5	1	5	1		5	1		5	1		5	1		5	1
Natural Disasters																



Manmade																	
Technological or Physical																	



The rows represent risks associated with *natural disasters* (such as earthquakes), *manmade emergencies* (such as strikes and terrorism), and *technological or physical events* (such as a failure of internal or external computer infrastructure or a ship lost at sea).

The columns represent probability, frequency, human impact, property impact, and supply chain impact of the event or occurrence being analyzed.

You then fill in the chart with all of the risks reasonably possible. Do not merely put down the “outlier” events (those that are major but infrequent occurrences). Always include those that are more minor in severity but occur with greater frequency. See [Exhibit 7–6](#).

#### Exhibit 7-6: Example—Risk and Business Disruption Assessment Chart

Category	Type of Emergency		Probability		x	Frequency		x	Human Impact		x	Property Impact		x	Supply Chain Impact	
	High	Low	High	Low		High	Low		High	Low		High	Low		High	Low
	5	1	5	1		5	1		5	1		5	1		5	1
Natural Disasters																
	Earthquake		4			2			4			5			4	
	Tsunami		1			1			3			5			2	
	Volcano eruption		1			1			2			3			2	
	Hurricane		5			3			2			4			5	
Manmade																
	Strikes		2			2			2			1			3	
	Terrorism		2			1			5			5			3	
	Political instability		1			2			1			1			4	
	Unreliable legal system		2			1			1			2			3	
	Bankruptcy—critical supplier		3			1			1			1			5	
Technological or Physical																
	Commo satellite failure		1			1			1			1			3	
	Ship lost at sea		5			2			1			3			4	
	Derailment		3			3			3			1			4	
	Computer virus		3			2			1			2			5	



## Sortation:

Type Of Emergency	Total
Earthquake	640
Hurricane	600
Terrorism	150
Ship lost at sea	120
Derailment	108
Computer virus	60
Tsunami	30
Strikes	24
Bankruptcy – critical supplier	15
Volcano eruption	12
Unreliable legal system	12
Political instability	8
Commo satellite failure	3

A rating scale is applied to each of the risks identified—for instance, a 1 to 5 scale with 1 as the lowest impact and 5 as the highest. The assessment of values—one to five—is subjective. See [Exhibit 7–6](#).

The rating in each row within a category is multiplied by the value of each preceding column, giving you a numeric total value for the respective events or occurrences. See [Exhibit 7–6](#).

Items are then sorted based on total value in descending order of significance. See [Exhibit 7–6](#). Prioritize which potential disasters can strike your company and prepare for them.

### Supplier Assessment

It is imperative to consider tradeoffs when choosing your approach to using single sourcing versus multisourcing of suppliers.

Consider a hybrid approach. This is where you rely on a main supplier for an item so as to ensure receiving the right item, in the right quantity, at the right place, at the right time, and *at the lowest overall cost*. Then, also establish a relationship with an alternative supplier with more flexible quantities and/or with lower and higher volume limits. The products from this second supplier will be higher; however, you have now increased your flexibility and reduced your supply chain risk.

In addition, consider only using single-source suppliers that have multiple manufacturing facilities for the critical items you are acquiring from them.

Irrespective of whatever sourcing approach used, it is important to assess and select each supplier prudently using a cross-section of criteria. See [Exhibit 7–7](#).

### Exhibit 7-7: Supplier Assessment and Audit

*Typical areas for review include:*

Financial condition	Training
Management	Service programs
Quality assurance controls	Health and safety compliance
Order management	ISO certification(s)
Capacity management	Location of facilities
Engineering capabilities	Political environment
Inspection techniques	Reliability of legal system where supplier is located
Purchasing controls	

Material handling capabilities	Environmental conditions
Claims handling controls	Transportation modalities available

Once you have completed your analysis of potential suppliers and have narrowed down the list to those you truly wish to consider, successful candidates can be selected through a variety of means including competitive bids, reverse auctions,<sup>1</sup> or direct negotiations.

### Lessen the Bullwhip Effect Through Coordination Within the Supply Chain

The solution to the bullwhip effect (where small changes in consumer demand result in large fluctuations in orders placed upstream because of flaws in forecasting supply and demand) is better coordination within the supply chain.

Some major obstacles and solutions<sup>2</sup> to coordination in the supply chain are:

OBSTACLES	SOLUTIONS
<b>Incentive Obstacles</b>	
<p>These are situations in which the incentives offered to different stages or participants in the supply chain result in localized or individual company decisions rather than decisions that reduce variability and overall supply chain costs. It is natural for a stage or participant to maximize those criteria on which it is being rated or incentivized.</p> <p>Example: A purchasing manager whose compensation is linked to holding down acquisition costs will buy in larger quantities and generate fewer purchase orders even if that increases inventory carrying costs.</p> <p>Example: Manufacturers cannot control the quantities their distributor or retail customers sell. Consequently its sales force isn't incentivized for the quantity sold to the distributor's or retailer's customers (sell-through), but rather the amount they sell to distributor/retailers (sell-in) during some defined period of time (e.g., a month, a quarter). To increase sales during the evaluation period, the sales force will offer whatever price or quantity discounts it controls even if the buyer isn't actually selling the increased quantities. This, in turn, causes unplanned fluctuations in demand. Sell-in incentives create order variability greater than customer demand variability.</p>	<ul style="list-style-type: none"> <li>■ To minimize the effect of incentives on SCM, it is necessary to review the types of decisions employees will make to achieve those incentives. The issue is, Does the incentive lead to decisions that are aligned with the organization's strategic goals? Further, will following the entity's procedures allow the decision maker to achieve the incentive while being in alignment with strategic goals? Basically, are the goals and incentives in alignment or in conflict?</li> <li>■ Any effort to move a sales force from sell-in incentives to sell-through incentives will help reduce forward buying and therefore lessen purchasing fluctuations, and the bullwhip effect.</li> </ul> <p>One way to move to sell-through is to incentivize the sales force over a rolling time period rather than for sales over a short timeframe (e.g., monthly, quarterly). This lessens the need to push sales hard during one period of time and sell to actual needs during another.</p> <p>Another way to move to sell-through is to incentivize the sales force based on the retailer's sell-through. This, of course, requires that the retailer share relevant point-of-sale information with you.</p>
<b>Information Processing Obstacles</b>	
<p>A lack of information sharing between stages of the supply chain will magnify the bullwhip effect where demand information gets distorted as it moves through the supply chain. The result is an increase in variability within the supply chain.</p> <p>Example: In its simplest sense, a retailer will order from its distributor based on orders it receives. In turn, the distributor will order from its supplier based on the orders it receives, and so forth. If one of the parties experiences a one-time spurt in sales, its supplier may incorrectly interpret the increase in orders or order size as a trend, and increase its orders to its supplier, etc.</p> <p>Now assume that a period of random order increases is followed by a period of random decreases. Participants will incorrectly decrease their demand, ultimately causing stockouts and expedited (expensive) purchasing.</p>	<ul style="list-style-type: none"> <li>■ If SCM is to be successful there must be availability of accurate information to each stage of the supply chain.</li> <li>■ A key piece of information that should be shared is point-of-sale (POS) data.</li> </ul> <p>POS data is important because the objective of any supply chain is to deliver a product to an end user. It is the final customer's order(s) that initiate the need for the supply chain at all. However, each stage of the supply chain uses orders to forecast future demand. Because the needs of different stages vary, forecasts at different stages also vary.</p> <p>If retailers share POS information with other supply chain stages, participants can better forecast future demand, coordinate it with actual end user requirements, and lessen the bullwhip effect. All participants making that effort become more</p>

	<p>profitable by not buying, making, handling, etc. materials and items that aren't needed at a particular time, if ever.</p> <p>The availability of POS information also allows suppliers, manufacturers, and retailers to engage in collaborative forecasting and planning. Without collaboration, simply having POS information available does very little to improve supply chain performance.</p>
<b>Operational Obstacles</b>	
<p>These obstacles include actions taken in placing, taking and fulfilling an order that lead to increased fluctuations in the supply chain.</p> <p><b>Example:</b> To get a better volume discount or to reduce its internal purchasing costs, a customer batches its orders and then purchases six weeks of its needs (a "large lot" order) from manufacturer X. It will not order again for another five to six weeks. In other words, there will be five to six weeks without orders followed by a large order.</p> <p>Another customer does the same thing but places its order with manufacturer X at a different time than the first customer.</p> <p>The manufacturer now has to produce for a demand that is out of sync with actual needs.</p> <p>If the manufacturer, in turn, then batches its orders to its suppliers, the bullwhip effect is magnified.</p> <p><b>Example:</b> Long or erratic lead or order processing times between stages in the supply chain will cause participants to buy and hold larger safety stocks than are justified by actual usage rates.</p> <p><b>Example:</b> A high-demand product is in short supply. The manufacturer wants to ration what it provides to its customers based on the percentage of all orders received. In other words, if it can only fulfill 67% of the total quantity ordered then each customer will receive 67% of its order. Its customers want to game the system by ordering more than they need hoping that the quantity they actually receive will fill all of its customers' orders (e.g., a customer needs 75 of the item but orders 100). Gaming the system leads to inflated needs projections, causing suppliers to build up supplies and capacity for orders that eventually never come.</p>	<ul style="list-style-type: none"><li>■ One way to stabilize pricing and predictability of supply is to enter into contracts with your suppliers that coordinate activities within the supply chain.</li></ul> <p>Historically contracting for goods and services has been a zero-sum game—I win, you lose. And, if your only objective is to get a one-time, best deal, then there is little incentive to structure agreements so that both sides achieve reasonable objectives. If, however, you want both a good deal and a relationship with a supplier that allows for future "good deals" and better SCM, then you'll have to structure agreements appropriately.</p> <p>Traditional zero-sum contracting does not work in SCM because each party makes decisions independent of the impact of those determinations on other parties.</p>
<b>Behavioral Obstacles</b>	
<p>Just as "all politics are local" so, unfortunately, are decisions related to supply chain problems. These problems include:</p> <ul style="list-style-type: none"><li>■ Each stage of the supply chain approaches issues locally without regard to the impact of its actions up- or downstream from it.</li><li>■ Different stages in the supply chain react to immediate local conditions rather than attempting to identify and correct the root cause (s) of the problem.</li><li>■ Different stages of the supply chain blame one another rather than seeking collaborative solutions.</li><li>■ Because each stage doesn't understand the impact of its actions on another stage, it repeats an action that causes the very problem it's complaining about.</li><li>■ A lack of trust between and among supply chain participants causes them to either not share information or to distrust (and ignore) data provided to them.</li></ul>	<p>By using the techniques above to engage in collaboration with other participants in the supply chain, you and your staff should be able to build trust-based relationships with other participants in the supply chain.</p> <p>As stated earlier in this chapter, any organization that hopes to effectively seize control of its supply chain must commit to a long-term strategic effort.</p>

Contracts That Do and Don't Coordinate the Supply Chain

Contracts that coordinate the supply chain are those between supply chain partners that allow every party's objectives to be aligned with the objectives of the entire supply chain.

## Wholesale Contracts

The supplier specifies a wholesale price and in return the buyer decides how much to order from the supplier. Specifically, when the retailer places an order, its payment to the supplier is proportional to the quantity it orders.

With wholesale contracts, the retailer generally orders less than the quantity that would be best for the entire supply chain because it bears all the risks of overstocking. Therefore, a wholesale contract does not coordinate the supply chain and, in fact, would tend to make the bullwhip effect more severe.

## Buyback Contracts

The supplier specifies a wholesale price and allows the retailer to return unsold inventory up to a specified amount, at an agreed-upon price. This puts some of the risk of overstocking on the seller and leads to a lower price for the buyer.

In these agreements the supplier specifies a wholesale price and a buyback price. For example, a supplier may agree to buy back a \$5 item (wholesale price) that has not sold for at least \$3 (buyback price). This lowers the loss to the retailer from \$5 down to \$2. The supplier absorbs the \$3 per unsold item as a reduction in margin. The buyback provisions encourage the retailer to buy more product, resulting in more product availability at a higher profit margin for both the supplier and retailer.

A downside to a buyback contract is that it leads to surplus stock that must be disposed of through salvage, return, etc. That, in turn, leads to higher supply chain costs.

## Revenue Sharing Contracts

The supplier and the buyer agree on a wholesale price below the typically discounted wholesale price, and in return the supplier receives a fraction of the revenue from each unit sold by the buyer (retailer).

This certainly encourages selling-through as opposed to selling-in as everyone benefits from an increase in product production and sales.

## Portfolio Contracts

A number of industrial manufacturers have been outsourcing everything from production and manufacturing to the procurement function itself. The increase in the level of outsourcing implies that the procurement function becomes critical for a manufacturer to remain in control of its destiny. An effective procurement strategy has to focus on both driving costs down and reducing risks.

- **Fixed Commitment Contracts:** A traditional procurement strategy that eliminates financial risk is to use fixed commitment contracts. These contracts specify a fixed amount of supply to be delivered at some point in the future; the supplier and purchaser agree on both the price and the quantity to be delivered. The buyer bears no financial risk, but takes huge inventory risks because of uncertainty in demand and the inability to adjust order quantities.
- **Option Contracts:** One way to reduce inventory risk is through option contracts in which the buyer prepays a relatively small fraction of the product price up front in return for a commitment from the supplier to reserve capacity up to a certain level.

The initial payment is typically referred to as “reservation price” or “premium.” If the buyer does not exercise the option, the initial payment is lost. The buyer can purchase any amount of supply up to the option level by paying an additional price, agreed to at the time the contract is signed, for each unit purchased. This additional price is referred to as “execution price” or “exercise price.” The total price (reservation plus execution price) paid by the buyer for each purchased unit is typically higher than the unit price in a fixed commitment contract.

Option contracts provide buyers with flexibility to adjust order quantities depending on realized demand and therefore these contracts reduce inventory risks. These contracts shift risks from the buyer to the supplier since the supplier is now exposed to customer demand uncertainty. This is in contrast to fixed commitment contracts in which the buyer takes all of the risk.

## Inventory Levels

Perhaps the easiest, but certainly not the least expensive, method of reducing supply chain risks is to have more safety stock. It's a tradeoff. More buffer stock, less risk but at a higher cost—less safety stock, more risk of stockouts but at a much lower cost.

## Recap

Since the 1980s, companies have wrung costs out of almost every aspect of their businesses. They accomplished this by implementing just-in-time and lean manufacturing techniques and technologies that ruthlessly eliminated or reduced lead times and inventory levels, by utilizing single-source suppliers, and by global outsourcing. The result has been materials and goods making their way to end users through long and complex supply chains.

Only in recent years have organizations begun to truly appreciate and react to the risks inherent in supply chains that have many weak links arising out of uncertain demand and supply, too little information or too much unstructured and therefore unusable information, as well as choke points where a single point of failure can break the entire chain.

## Review Questions

1. "Sell-through" relates to a sales force: ?
  - a. Selling through deep discounts.
  - b. Selling based on the sales of its customers.
  - c. Selling based on incentives for sales volumes during a defined period of time.
  - d. Selling through strategic alliances.
  
2. The bullwhip effect refers to: ?
  - a. The phenomenon where variations in demand fluctuate throughout a supply chain.
  - b. A negotiating tactic in which suppliers must bid against one another for a one-time sale to a retailer.
  - c. The effect on risk in a portfolio contract.
  - d. None of the above.
  
3. True or False. ?

Supply chain management software is unrelated to the information in enterprise resource planning software modules.

  - a. True
  - b. False
  
4. True or False. ?

Strategic activities deal with getting items into and through an enterprise, while logistical activities deal with suppliers and customers throughout a supply chain.

  - a. True
  - b. False
  
5. Information hubs are: ?
  - a. Analyses of all costs associated with initially purchasing an item.
  - b. Analyses designed to find the lifetime costs of acquiring, operating, and changing something.
  - c. Internet-based, private company–hosted software packages the architecture of which allows a company to share important information with its suppliers and customers electronically.
  - d. Both a. and b. above.

## Answers

1. (b)
2. (a)



3. (b)

4. (b)

5. (c)