

Chapter 1

Introduction to Supply Chain Management



In today's operating environment, successful companies need to become involved with their customers and suppliers. As international markets have been expanding and competitive pressure has also been increasing, companies must produce those items and services that customers want and need. Today's market is a customer's market; if companies are not clearly focused on customer requirements, ultimately they will lose their valuable customers.

Over the last 30 years or longer, many big organizations and firms believed that it is difficult to manage the entire business unit in a **vertically integrated company** (a firm possessing its own suppliers and/or customers) effectively. Hence, companies were merging and selling off their business departments. In simple words, companies are diverting from their core capabilities due to involvement in several business (vertically integrated) activities. Alternatively, companies may try to create strategic partnerships or alliances with suppliers, distributors and other companies who have capabilities similar to their own. This approach has made and distributed services and products the most efficiently and effectively helping companies to stay successful.

There is no doubt that several factors are at play and are influencing companies to enhance teamwork more. IF (Information) is exchanged by ERP (enterprise resource planning), EDI (electronic data interchange), RFID, GPS, Internet, etc. Communication technology is rapidly and continuously changing. Due to technology, team work is becoming easier than ever before.

1.1 What Is Supply Chain?

Several definitions exist in different books and research papers. A few of these are given below.

The term of SCM can be understood as,

SCM is a complete set of approaches utilized to integrate all partners of a supply chain efficiently, including suppliers, manufacturers, stores and warehouses, so that products are manufactured and distributed to the right place at the right time with the right quantities, in order to minimize system-wide costs, meanwhile meeting service level requirements—(Designing & Managing the Supply Chain by: Simchi-Levi et al. 2000)

OR

The design and management of seamless, value-added processes across organizational boundaries fulfil the real needs of the final customers—(The Institute of Supply Management—ISM)

OR

The planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers and customers—(The Council of Supply Chain Management Professionals—CSCMP)

Supply Chain Management in Action: Where Does the Coal Go?

At the same time most every year my dad would be asking, “But where does the coal go?” We’d be on our family vacations on Lake Erie, and as a lover of ships, he’d closely observe the comings and goings of the big freighters that moved ore, coke, iron, coal and other goods and materials east and west across the Great Lakes. He’d explain why certain ships rode heavy (low in the water and slow) /light (high in the water and fast), and what goods/materials were in the ones coming from the west, where they came from and what part they played in making steel—and in turn, what was carried in the bowels of these big ships, a couple of them one thousand feet long.

One of those cargoes was coal, and the coal-bearing freighters would always pull in and unload at the harbour three miles east of us. But the one piece of all this activity—shipping, delivery and transfer and supply puzzle that my father could not quite figure out was what happened to the coal after it was delivered (unloaded) at the harbour in Conneaut, Ohio.

Oh, he knew what its ultimate fate would be and the role it would play in making products, steel etc., but he could not figure out the physical steps involved with the movement and transfer of that coal inside of the harbour, and that really bugged him.

He and I would try to find secluded roads leading into the back of this enormous industrial harbour so we could see where the coal went, but we would always be caught short by fences bearing grim warnings. We tried hiking in from the far shore, hacking our way through thick woods, but always the fence would stop us.

So I took my fellow seeker on a surprise outing. We parked at the little airport in Erie, Pennsylvania, where I chartered a private airplane. For a few hours, the pilot flew us all over Lake Erie, swooping down over the decks of some of the freighters as they made their way across the lake and circling sometimes over the Conneaut harbour.

I will never forget the sound of my father laughing and slapping his knee as he looked out the window at the massive expanse of the harbour that we had never been able to see from the ground as he said; “Now I see where the coal goes!” We had to go a half mile up in the air to get the complete overview of all activities and perspective we needed, but finally, we got it.

He saw the railroad shunt that moved the coal from the big ships to machines that transferred it to a massive web of railroad cars that linked up with rail lines heading south and thence all over the country. I suspect at some level he always knew this is what went on, but he had to see it; he had to really know; he had to be able to tangibly put into place that last piece of the puzzle that ran across thousands of miles of water and rail lines and touched hundreds of industries and sectors.

I have been thinking about this a lot recently because firms of all sorts seem to be striving for the same kind of complete view (end-to-end) of their supply chain, from their farthest-flung suppliers through their partners to their customers and even out to their customers’ customers. The need to know, to really know and to have complete vision, is becoming increasingly vibrant in this business world that moves and changes so quickly.

Thanks for indulging me in this mostly personal tale of complete (end-to-end) vision. I would like to close by adding that several weeks after our plane ride, my father died quite unexpectedly. But before he left us, he got to see where the coal went.

Source: Evans, B., “Remembering My Dad”, Information Week, 2010 July, 26: 6–7

1.2 Value Chain and Supply Chain

Usually many students are confused by the difference between SC (supply chain) and VC (value chain). In fact, there is no definite answer to this question. In the 1980s, Michael Porter first articulated the concept of VC; he believed that primary and supportive activities comprise a company’s VC and these activities can create competitive edge when configured properly.

One school of thought to distinguish a supply chain from VC is conceptualizing the SC as a subcategory of the VC. In an organization, all personnel are part of the VC, but all personnel within a company are not part of a SC. Compared with the SC, the VC is much wider, because it covers (includes) all activities in the form of basic activities and supportive activities. In addition, the VC’s original concept is mainly emphasized on international participants, whereas a SC, by definition, is both externally and internally highlighted.

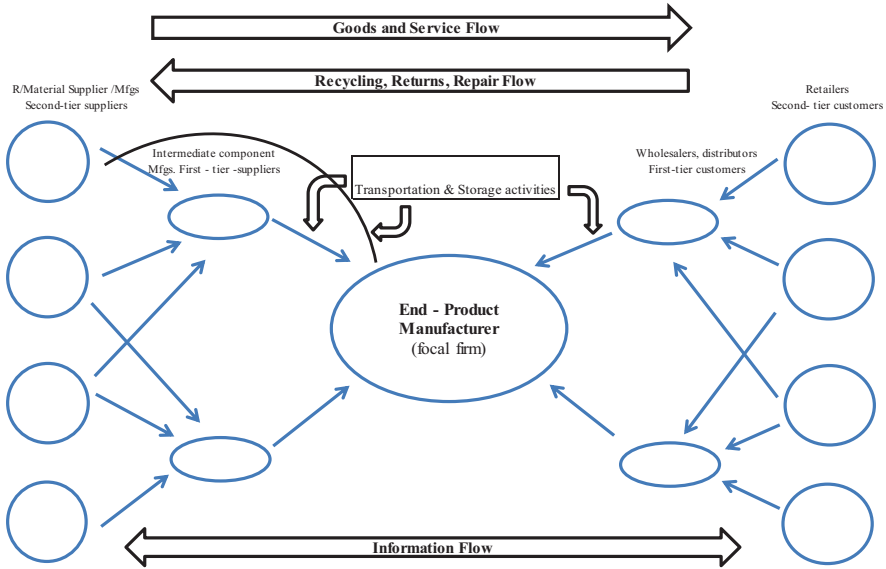


Fig. 1.1 A generic view of supply chain

1.3 A Generic View of Supply Chain

A generic picture of supply chain has been shown in Fig. 1.1. Raw materials such as iron and wood are extracted from the ground by companies and then sold to suppliers of raw materials, for example, lumber companies or steel mills. These companies act on POs (purchase orders) and specifications they have received from component producers, and then these producers convert raw material into materials that can be used by these customers (such as lumber and sheet steel). Then manufacturers of components, responding to the orders from their customers (the finished goods manufacturers), produce goods and sell intermediate products their customers want. The final goods producers (firms like General Motors, Coca-Cola) assemble the intermediate products they have received and sell the final products to wholesalers/distributors, who resell products to retailers as their orders. Then finally, retailers sell those products to end consumers.

Consumers buy products and services from companies based on select criteria. Each and every consumer has its own requirements and criteria. But generally consumers buy products on the basis of the following criteria.

1. Quality
2. Cost
3. Range of the products
4. Availability
5. After-sale service

Those companies who fulfil the wants and requirements of the consumers become successful leaders in the market. That's why now many companies have one product in different SKUs (stock keeping units) in terms of depth and breadth of products, and use a broad range of distribution to make sure of availability, etc. In the whole supply chain, several times customers need to return products due to defects in the products, warranty repairs or recycling. All these activities are related to reverse logistics, which will be further discuss in Chap. 7.

The series of firms eventually producing and making services and products available for the customers—including all the functions that enable purchasing, manufacturing, storage and delivery, return or recycling of materials, end products and services—in the broader aspects, are all called supply chain. Nowadays, in supply chain, several companies have multiple supply chains for their multiple products to fulfil the requirements and needs of customers. The idea of today's supply chain is to make the “customer delighted not only satisfied”. Nowadays supply chain is more complex compared to traditional supply chains, where only a few suppliers and retailers exist and manufacturers produce a limited range of products. But today's manufacturers have multiple products under one roof, and several suppliers, distributors/wholesalers and retailers are involved in each product's supply chain. There is only one source of income for complete end-to-end supply chain organizations—end consumers or customers. In the words of Steve Darendinger, VP (vice president) of Ciscom Systems of California, “companies must develop effective SCM programs keeping the customer in mind”. Whenever one individual company ignores the interests of remaining supply chain members or final customers/consumers, ultimately these suboptimal decisions transfer higher level risk and cost along the supply chain. For example, generally the higher prices of end products will lead to lower customer service levels or may lower end-customer demand.

1.3.1 A Simple Example of Supply Chain

In this complex model, multiple companies are involved as supply chain members and several companies belong from other regions or countries. But in a simple SC, companies pull raw materials from their source, process, package and finally ship to the customers.

The example of cereal producers will explain well the simple SC. As displayed in Fig. 1.2, a cereal manufacturer purchases the grain from a farmer and then processes it into cereal. The firm also purchases paperboard from a paper producer, who bought the trees for making the paper, and labels from a label producer, who purchased semi-product label stock to produce the labels. After packaging, the cereal is dispatched to a distributor, and then the distributor ships/dispatches the material to a store; then the store sells it to a final customer. Even for an ordinary product like cereal shown above, the number of business transactions and raw materials and flow of information can be considerable.

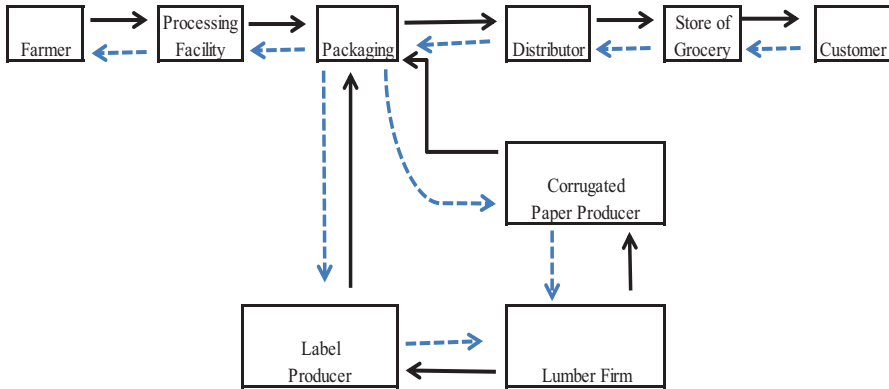


Fig. 1.2 A supply chain of cereal producer

The cereal manufacturer's SC features a widespread distribution network, which is engaged in delivering the packaged cereal to the end customer/consumer. Inside the portion of downstream SC, mainly it is logistics managers' responsibility to move goods/materials between locations.

Transportation management is one important role of logistics, involved in the screening, checking, selection, and management of external carriers such as airlines, shipping firms, trucking firms and railroads or the management of private fleets (internal) of carriers. Distribution side management involves the handling of materials, packaging, storing, moving, receiving, warehousing and retail outlets.

1.4 The Umbrella of Supply Chain

A broader set of activities in addition to purchasing is part of SCM (supply chain management). Every activity looks diverse, but all these activities have one significant characteristic in common—they are part of a network, which will describe how effectively and efficiently goods, products and information flow across a SC. While the related activities SC needs to perform have existed for several years, it is a company's enthusiasm, willingness to align, integrate, coordinate and synchronize all these activities and the flow that is relatively new. What kind of activities do act as a part of this SCM concept?

1.5 Management Activities

1.5.1 Purchasing

Many companies implement purchasing as a main activity of SC because companies purchase a raw material from supplier and then process it further for value-addition. Since the 1980s, many companies have started work on cost minimization and

elimination of waste in different parts of the purchasing process, including paperless purchasing, supplier relationship management and supplier development. There is no doubt that the purchasing role is very crucial and companies can save millions of dollars through good negotiation techniques, elimination of waste, supplier relationship management and building trust.

1.5.2 Inbound Transportation

Usually multinational firms have a specialized traffic and transportation function to manage the informational and physical links among the buyer and the supplier. For many companies, transportation is the single biggest classification of costs, especially for greatly diversified companies. While a company may have minimal common requirements for purchasing among its operating units, usually there are opportunities to coordinate and manage the purchase of transportation services.

1.5.3 Quality Control

Due to the tough competitive environment of the last couple of decades, companies are emphasizing quality control. In the new practices of supply chain, companies detect defects at the time of receipt of the material. One step more, companies are closely working with supplier to minimize the cost and increase the quality of products.

1.5.4 Planning of Demand and Supply

Demand planning contains forecasts of anticipated demand, adjustment of inventory, orders taken but not filled and spare parts and aftermarket requirements. Monitoring demand data and developing a supply, manufacturing and logistics network capable of fulfilling the requirement of demand comprise supply planning.

1.5.5 Receiving, Storage and Material Handling

All in-bound raw material/goods should be physically received when it transports from a supplier to a buyer. Generally, except in a JIT system environment, material must also be staged, received, handled and stored. These activities are commonly part of the material management function due to the requirement to manage the physical handling and processing of inventory. Receipts from users showing that services have been completed are also reviewed by receiving to trigger payment of related invoices.

1.5.6 Material Control or Inventory Control

The material control term includes responsibility for determining suitable quantities to order on the basis of forecasted demand and then managing materials released by suppliers.

It is usually the inventory control group's responsibility to determine the level of inventory of final goods required to support customer needs and requirements, which focuses on the physical distribution side (downstream) of the SC. Integrated SCM means that the inventory and material control groups coordinate their efforts to guarantee an uninterrupted and smooth flow to customers/consumers.

1.5.7 Order Processing

Order processing supports and helps to ensure that customers receive materials where and when customers require them. Order processing is a vital role of SCM (supply chain management). It shows a link between the manufacturer and the customer (external).

1.5.8 Production Scheduling, Planning and Control

These activities involve determining a time-phased production schedule, developing short-term schedules of production and managing WIP (work in process) production. The plan of production usually depends on forecasts from the marketing department to evaluate the quantities of materials that are needed over the upcoming term.

1.5.9 Warehousing or Distribution

Products need to be stored in a DC (distribution centre) or warehouse before being dispatched towards customers. This is specifically true for firms that manufacture per the expectation of future sales.

1.5.10 Shipping

The shipping activity includes physically receiving goods/products ready for distribution towards the customer. This function includes packing to make products safe from damage, pilferage and meeting labelling requirements, completing the shipping documents and arranging transportation. There is no doubt that, outbound transportation and shipping must work closely.

1.5.11 Customer Service

Currently, in competitive environment, CS (customer service) means not only keeping customers satisfied, but also delighting them. The basic three factors of CS are: first, “pre-transaction”; second, “transaction”; and third, “post transaction” activities.

1.6 Supply Chain Integrations

Supply chain integration is one sustainable approach for minimizing cost and improving service levels. But unfortunately, integration is not easy.

In the whole supply chain different entities may have different targets. For example, suppliers want manufacturers to commit themselves to buy large quantities with stable volumes and flexible delivery dates. But most producers want to implement long-run production; it is necessary for them to be flexible to their customers’ requirements, needs and dynamic/changing demands. So the goals of suppliers are in direct conflict with the producers’ desire for flexibility. Certainly, as decisions of manufacturing are typically made without exact information of customer demand, the manufacturers’ capability of meeting supply and demand are mostly dependent on their ability to change volume of supply when information on demand arrives. Likewise, the objectives of producers making large batches of production typically conflict with the goal of distribution centres and warehouses to minimize inventory. Finally, this latter objective of minimizing inventory levels typically suggests higher transportation costs.

1.6.1 Example of Korean Manufacturer

A manufacturer of electronic products such as industrial relays is facing a service level of about 70%; that is, only about 70% of all orders are delivered in time. On the other side, inventory keeps piling up, mostly of items that are not in demand. The inventory turnover ratio, defined as the ratio of the annual flow to average inventory at the manufacturer’s main warehouse, is about 4. However, in the industry of electronics, leading firms turn inventory over about 9 times a year. If the manufacturer can increase its inventory turns to this level, it will be able to significantly minimize inventory levels. The manufacturer is thus searching for new strategies that will increase service levels over the next 3 years to about 99% and, at the same time, significantly decrease cost and inventory levels.

A couple of decades ago, several authors said these two objectives cannot be achieved at the same time.

1. Improved service levels
2. Inventory levels

Indeed, from the traditional theory, we know that, for higher service level, the company should keep a higher inventory level. Interestingly,

1.7 Why Vertical Integration Failed

In the light of SC theory, supply chain works as a singularly competitive unit, interconnected, accomplishing what many big, vertical integrated companies failed to achieve. There are several examples of different companies', such as Ford Motor, vertical integration. The major reason for failure is "lack of capability and diverting from their core business". Supply chains are evolving; new entrants are coming in the market with more capabilities and skills, and every company is shrinking and minimizing its expenses and waste for healthy profits or survival in the market.

Vertical integration (VI) also has some advantages like control over the whole business, in order of quality, schedule planning and forecasting, etc. But, generally, vertical integration has more disadvantages than advantages, such as lack of capability, lack of knowledge about raw-material business, difficulty in managing big operations, diverting from the core business of the company. According to several academic researchers, whenever a company moves two or more steps from its core business, it fails 2/3s of the time.

Vertical integration strategy is too risky, difficult to reverse and involves huge cost. Sometimes vertical integration is necessary, but more often than not it is unnecessary. The reasons used by senior managers to justify these strategies are usually invalid. Examples are "assuring market access, building closer relationships with customers, gaining customer trust, and reducing cyclicality". These reasons are sometimes valid, but often not. Finally, whether vertical integration is profitable or not is a challenging question and depends on several factors, including capabilities of company management, knowledge of businesses and employees' skills. In simple words, vertical integration strategies are not "fit to all". However, there are some success stories behind vertical integration, such as Du-Pont acquiring Conoco Inc. in the year of 1981, a \$7.3 billion transaction. The chairman of Du Pont stated that the merger would give the firm "a captive hydrocarbon feedstock source" and would minimize the exposure of the combined firms to fluctuations in the price of hydrocarbon and energy.

1.8 What Is the Bullwhip Effect?

The Bullwhip Effect has been one common issue in businesses. It starts from the downstream (end customers) side of the supply chain and swings in larger and larger "wave" hits to the upstream manufacturer/supplier. As a result of these waves end-to-end, all supply chains are disturbed and huge inventory pile-ups occur in the different stages of supply chain, which results in huge cost. According to the APCIS

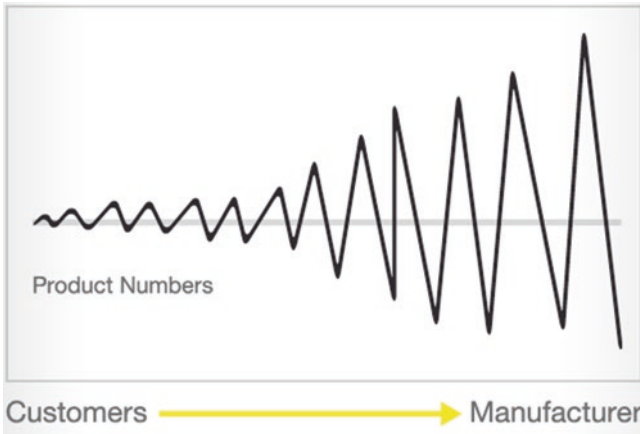


Fig. 1.3 Bullwhip effect

and SCC (Supply Chain Council) USA, (2014) inventory cost in the supply chain is approximately 60–70% of all business. Finally, “Inventory is the Killer” because all this inventory also has its own expenses, such as carrying cost, pilferage cost and expiry cost, which creates unnecessary burden over the supply chain.

For example, if the actual order received from a customer is 8 units, the retailer’s order sent to distributor may then be $8 + 3 = 11$ units (the retailer may then order $8 + 3 = 11$ units from the distributor). Similarly, the distributor will give an order of $8 + 3 + 20 = 31$ units to the manufacturing company, so ultimately the real demand of product has been changed. Now 23 units have been manufactured as an excess inventory. This is called the bullwhip effect (Fig. 1.3).

1.8.1 The Causes of Bullwhip Effect

There are several factors, which play a role in the bullwhip effect. But here, we have listed some of the major factors which contribute to the bullwhip effect.

- Lack of Communication
- One major reason for the bullwhip effect is lack of communication. Under its impact, it is difficult to run the processes smoothly. Due to the improper/lack of communication among supply chain partners, the managers can receive product demand quite different from the real demand of end customers.
- Disorganization
- Disorganization among each supply chain link results in ordering smaller/larger amounts of a product than is needed due to an under-/over-reaction to the supply chain beforehand.
- Order Batching

- Firms may not place orders to the suppliers in real time, often accumulating the demand first. Mostly companies order on weekly or monthly bases. This creates variability in the demand of products as, for instance, a surge in demand may take place at some stage followed by no demand after.
- Price Variation
- The one reason of bullwhip effect is “price variation”. Mostly, companies start their promotion activities, special discount offers. This can increase the consumer’s regular buy patterns. Due to the special discounts, consumers want to take more and more advantage of special offers, and they may store products in huge quantities. This can cause uneven production and distorted demand information.
- Demand Information
- Several companies may rely on past demand information of products to forecast future demand information without involvement of customer requirements, market feedback or simply without any fluctuation that may occur in demand over a period of time.
- Free Return Policies
- Intentionally, customers can overstate demand due to expected shortage of products and can cancel the orders. When the supply is adequate again, without return forfeit, retailers will continue to exaggerate their needs and cancel orders, resulting in excess inventory.

1.9 The Snowball Effect

The snowball effect starts from the upstream side. Variability of supply quantities and supply delays increase as one moves downstream. For example, a small fault in a supplier machine can cause a 3-day delivery delay to the manufacturer in China, and it will result in a 6-day delivery delay to the Distributor in Malaysia, finally, snowballing into a total 12-day delay in delivery to the retailers/customers in Europe (Fig. 1.4).

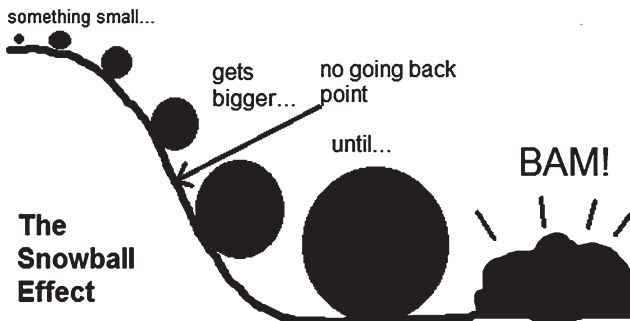


Fig. 1.4 The snowball effect

You have no choice other than to roll until it stops.



1.10 The Importance of Information Sharing

According to Gumaer (1996) and Davenport (1998), in today's competitive environment, firms cannot survive successfully without IT (Information Technology).

Visibility and speed (velocity) is the one major competitive edge in the SC, which can be obtained by usage of latest technology and information sharing.

In the SC, information sharing plays the role of backbone. According to the APCIS–USA–CSCP Module Books (2013), information sharing has solved several complex and difficult supply chain problems. There is no doubt, IT (Information Technology) has its own importance in the sharing of information among all supply chain partners.

According to Gumaer (1996), in today's competitive market, companies cannot survive without information technology. In the SC, speed is one of the major competitive edges, and this advantage can be achieved by investment in information technology like ERP (enterprise resource planning) (Davenport 1998).

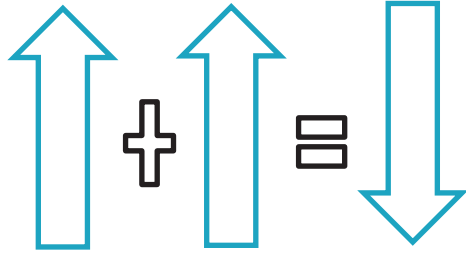
When organization, its suppliers and customers all know each other's future plans and are willing to work together. Ultimately the planning process is more productive and easy, in order of improvement in quality, cost savings as well as higher service level. All these objectives can be achieved by information sharing.

As per the knowledge of APCIS–USA–CSCP Module Books (2013), the concept of 3Vs explains the importance of information sharing. Visibility and velocity play a critical role in minimizing variability in the SC. Variability is called the error or variation.

The concept of 3Vs explains how to minimize variability from the whole supply chain. If visibility and velocity are higher, ultimately variability in the SC will be minimized (Fig. 1.5).

For instance, as in one company, a sales or marketing person knows the actual level of inventory in finished products warehouse, then he can commit (sooner and

Fig. 1.5 The concept of 3Vs



more timely delivery) with customers, and there will be fewer chances of error, miscommitment and disruption in the chain of supply. Finally, variability in the end-to-end SC of the company will be minimized. Similarly, if all supply chain partners know each other's future plans, then actual demand disruption in the end-to-end supply chain will decrease.

Visibility and velocity have a negative proportion of variability. So here, one simple question comes to the student's mind: how can we increase information sharing between SC partners?

Generally, information sharing can be enhanced in the supply chain by the following ways:

1. Willingness of SC partners to share their information
2. Usage of latest IT (Information Technology) for real-time information sharing.

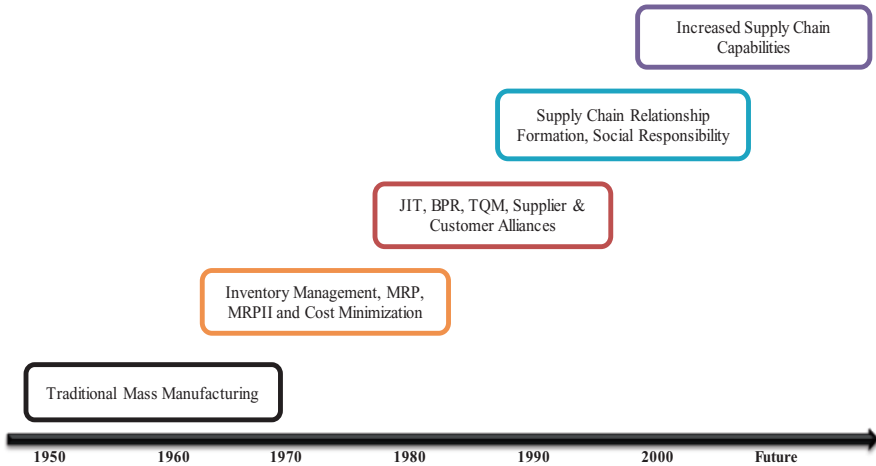
But, these two points are well integrated. Firms cannot achieve information sharing goals simply by using the latest technology. The firms' management should be willing and open to sharing information with their supply chain partners. There is one school of thought that somehow firms can achieve information sharing goals by only "willingness to share information". On the other hand, this approach will not be very effective (especially for the large, medium organizations) or reliable.

1.11 The Beginnings of SCM in the USA

During the 1950s–1960s, the American manufacturers were employing and focusing on mass manufacturing techniques to minimize costs and promote productivity; however, very little attention was paid to construct positive relationships with suppliers, improving processes and quality, etc. (Table 1.1).

It was slow to design and develop the new product, which was dependent exclusively on in-house resources capacity and technologies. Information sharing and expertise through strategic buyer-supplier relationships were basically unnoticed. In factories, the floor was cushioned with material inventory to keep machinery in smooth running as well as maintain balanced flows of materials, resulting in huge investment in WIP (work in process) inventories.

Table 1.1 Supply chain management events in the USA



In the 1960s–1970s, computer technology enabled MRP (material requirement planning) software applications, and MRPII (manufacturing resource planning) software applications were developed. Finally, these technologies helped firms in effective materials management.

The 1980s were the breakout years for SCM (supply chain management). During the 1980s, several research results were published in numerous journals, and intense global competition was beginning. Companies were emphasizing TQM (total quality management), JIT (just-in-time), production efficiency and delivery times, BPR (business process re-engineering), supplier and customer alliances, etc. But since the 1990s, the competition has become more intensified, accompanied by increasing inventory costs, transportation costs, the challenges associated with manufacturing efficiency, new product design and development, improving quality, customer service and delighting customers.

Finally, the companies (manufacturers) started buying material from selective certified suppliers to ensure the quality of materials as well as involving these suppliers in the company’s new product design and development activities. These practices help manufacturers to minimize the cost, and make improvements in quality, delivery time and customer service. On the other hand, suppliers enjoy the large amount of consistent orders from manufacturers. According to several works of research, buyer-supplier alliances have turned out to be a success.

1.12 3PL Logistics and 4PL Logistics

3PL logistics and 4PL logistics are not the same. Generally, students are confused about both terminologies. According to the APCIS–USA–CSCP Module Books (2013), 3PL is identified as “Entity that provides product delivery services for a company (buyer and supplier). The third party actually performs/manages one or more logistics services”.

4PL is defined as “One logistics specialist that plays the role of general contractor takes over the complete function of a logistics manager for a company and coordinates the combination of divisions/subcontractors necessary to perform the specific task involved.”

In light of the above explanations, third parties have little/limited resources and cannot provide complete solutions for organizations. On the other hand, 4PL logistics can provide complete and comprehensive SC solutions which combine the capabilities of management consulting, IT and third-party providers for their customers/clients (organizations), and fourth-party logistics companies can do subcontracting if necessary. But third-party logistics companies cannot do subcontracting. Fourth party does not mean that four parties are involved in all activities. The number of “4” refers to the fact that this kind of logistics is more specialized and higher than third-party logistics (3PL). In simple words, 4PL companies can play the role of 3PL. But 3PL companies cannot play the role of 4PL.

There are several benefits and a couple of risks associated with 3PL and 4PL (Fig. 1.6). Some major benefits and risks are given below.

Benefits of 3PL logistics

- Flexible workforce
- Focus on core competencies
- Efficient warehousing
- Improved customer service
- Latest technology and technology flexibility

Benefits of 4PL logistics

- Focus on core competencies
- Higher quality logistics reduced costs
- Greater business flexibility

There are also a couple of risk factors involved in 3PL and 4PL logistics including:

- Less or weak control over logistics
- Risk of inefficient service

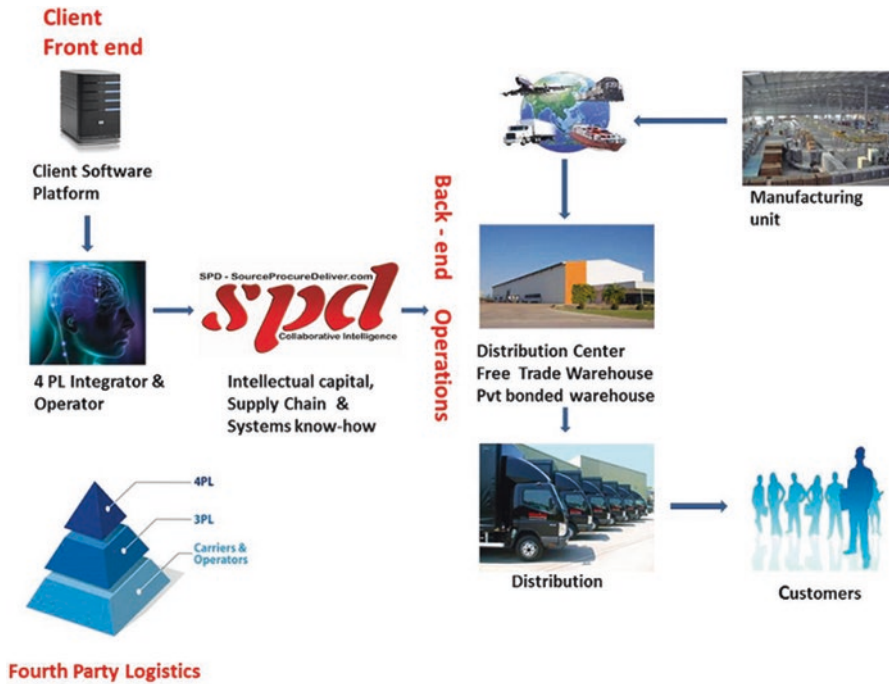


Fig. 1.6 Fourth-party logistics. Supply chain practitioners and researchers are debating over 5PL

1.13 Latest Trend in Supply Chain Management

SCM practice is a fairly recent phenomenon, and several companies are starting to realize both the problems and advantages accompanying integrated SC (supply chain). There is no doubt, SCM is a time consuming and complex undertaking, involving cultural change and difference among all of the participants or most of the participants, investment in latest technology (communication systems and software), the trust building among SC partners and a realignment/change of the competitive strategies employed among at least a couple of the participating companies. However, as competitors, customers, customer requirements and technologies change, the priorities in SC also must be changed; managers need the SCM structure to be more flexible to respond to all these unanticipated challenges.

When we look at the latest trends and practices in SCM, several issues arise themselves as areas that should be discussed covering supply chain responsiveness, reducing total cost of supply chain, building trust and collaboration among SC partners, green SC, expanding the SC.

1.13.1 Supply Chain Responsiveness

In the responsive SC, *agile manufacturing*, *lean manufacturing*, *mass customization*, *quick response* and *Just-in-Time* are all terms referring to ideas which intend to make the company more responsive and flexible to fulfil customers' requirements and make them satisfied.

If companies really want to achieve a greater level of responsiveness, they need to identify their final customers' wants and needs, and look at what the competition is doing to determine their SC services and products to compete successfully. And lastly, companies must consider the effect of these requirements on each of the SC participators. Once the companies in the SC sufficiently identify these requirements, additional improvement in responsiveness comes from faster product delivery systems, designing more effective communication and information sharing systems as products and information pass through the SC. SC partners must also continuously observe changes occurring on the ground (marketplace) and then use this latest information to reposition SC partners and output to stay competitive in the market.

Supply chain responsiveness requires companies to check and re-evaluate their SC relationships, reposition and automate warehousing, utilize business process re-engineering, minimize new product design cycles, design new products, standardize processes, train workers in multiple skills, factor in customer feedback, and finally link all of the SC members' real-time information systems together through use of modern technologies. So, very soon, it is seen that achieving higher levels of customer satisfaction by responsiveness is likely to require significant changes in technical aspects of providing services, products throughout the SC .

1.13.2 Reducing Total SCM Costs

Today's supply chain has several challenges and one of the big challenges is "Total Cost Minimization in the Supply Chain". In several companies, top priority is Cost Reduction, and to achieve this objective, companies are using different strategies, approaches and techniques, such as lean manufacturing, elimination of waste, strong buyer-supplier relationships, reducing extra inventories, minimizing the cost of procurement and distribution. As SC becomes mature, it tends to improve performance as a result of these cost minimizations through the use of CI (continuous improvements) efforts, integration processes, usage of latest technology to manage inventory, increased inventory visibility capabilities, better communication and relationships building among supply chain partners

According to a recent survey conducted in *Chicago*, 82% of company CEOs (Chief Operating Officers) said their firm's present SC initiative was directly related with cost reduction.

Companies are also investing a huge amount in different software applications to streamline their SC, and several firms are hiring 3PL consultants (spend management) to minimize SC costs. In light of research findings, Greg Aimi, research director at Boston-based business research specialist AMR Research, firms using TMS (transportation management system) software application right now account for lower than 40%. “If you do not use TMS, and if you are using traditional approaches, such as spreadsheets to handle the routing and transportation, then a large part of the savings identified during purchasing will vanish and be lost”.

1.13.3 Trust Building and Collaboration

In the modern SC, coordination with supply chain partners is significant in the whole SC business. The relationship building, cooperation and collaboration concepts began during the 1980s in response to a competition rise in the market and cost pressures from the customer side. The supplier relationship and collaboration give several advantages—primarily cost cutting, supplier involvement in product design, improved customer service, quality improvement, etc.

According to Khan and Dong (2017a, b) information sharing throughout the SC depends on IT, as well as on improved information through collaboration and trust building techniques. These collaboration techniques have several benefits, including cost minimization, improvement in scheduling and planning, higher customer service level.

Unquestionably, in the last couple of decades several researchers and practitioners have richly discussed buyer-supplier relationships, collaboration, partnerships, trust building among SC partners, sharing information with SC partners. But still trust deficits exist in many supply chains; partners need to improve their relationships and trust building.

In the words of C. John Langley, a professor of Georgia Institute of Technology, “*The idea that firms should work together and coordinate activities has always been around, but ask people today what one of the major killer problems with companies’ supply chains is today, and they say firms do not work together very well*”.

1.13.4 Green Supply Chain Management

Manufacturing, purchasing, storing, moving, packaging, delivering, and after-product life cycle or returning products would present a very crucial threat to the environment in order of waste scrapped toxic materials, emissions, traffic congestion or other forms of industrial pollution. As time passes, the practices of SC matures; government officials and authorities together with companies and their SC (supply chain) members are struggling to minimize hazardous chemicals or, on a broad perspective, to avoid “environmental pollution”.

According to the large supermarket groups and researchers, there is a significant business reason for succeeding in sustainable/green SC initiatives.

There are several companies shifting towards green supply chain due to the potential in the market, for commercial reasons, and to attract their customers and communities. A big example is Wal-Mart during 2007, when Wal-Mart began shifting the firm's emphases to its customers, suppliers and their communities. As we can see, they have made marvellous and great contributions to sustainable supply chain practices. Due to their big size and influential factor in their SC, they have made a crucial and remarkable change in the way their logistics firms, customers, and suppliers consider sustainable supply chain (Fig. 1.7).

One very famous example of Wal-Mart commitment along environmental supply chain is "lots of stores as early as 2010 were using the waste oil from their deep-fryers to fuel Wal-Mart trucks. Wal-Mart is hip to biodiesel? You bet".

As per several authors and researchers, relationships among firms in a well-managed SC are much more conducive to taking a proactive approach to minimizing the harmful environmental consequences of manufacturing, storing and moving goods and products as they wend their ways through the SC. Over time, end-customer sentiment with green processes and the prevention of global warming has tended to increase this hot-topic concern for firms to manage their SCs.

Unfortunately, increasing demand for green or sustainable goods and services is misleading. Several firms nowadays are flooding the market with environmental products. During the years 2007–2009, there was almost 79% increase in green products, according to the TerraChoice (environmental marketing company) based in Canada. In reality, a research study of TerraChoice of 2219 commodities claiming to be sustainable/green products found 98% to be misleading in their claims.



Fig. 1.7 Green supply chain management

1.13.5 Expanding the Supply Chain

Today, companies are trying to increase their business partners (especially foreign organizations) to accommodate market expansion plans and to achieve higher responsiveness in foreign markets. In the modern supply chain, firms are working with companies located all around the world to integrate various activities, including manufacturing, logistics and purchasing.

However global expansion of SC is occurring, companies are trying to expand their control over the SC to include 2nd and 3rd tiers of customers and suppliers. This SC expansion happens on two fronts:

- Increasing the SC's breadth to cover foreign sales offices, manufacturing facilities and retail sites, etc. with foreign customers and suppliers
- Increasing the SC's depth to cover the influence of 2nd and 3rd tiers customers and suppliers.

As companies become more experienced with their SC trading partner relationships, there is a trend to expand the breadth or depth of the SC by building relationships with their 2nd and 3rd tiers customers and suppliers. This span expansion trend and phenomenon has happened since the 1990s in various industries and is expected to continue to increase as the practice of SCM matures.

Discussion Questions

1. What is supply chain management?
2. Explain the value chain and supply chain.
3. Draw and explain the generic view of supply chain.
4. What are the activities included in the concept of supply chain management?
5. What are the advantages of supply chain management?
6. Explain vertical integration in your own words, and the benefits and disadvantages of vertical integration.
7. What is the bullwhip effect? What are the major causes of bullwhip effect?
8. Explain the snowball effect with an example.
9. Explain the 3Vs concept and importance of information sharing in supply chain management.
10. What is the difference between third-party logistics and fourth-party logistics?
11. Discuss the major advantages and disadvantages of third-party logistics and fourth-party logistics.
12. What is the latest trend in supply chain management? Discuss with examples.

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