

**A PROJECT REPORT  
ON  
A STUDY OF SUPPLY CHAIN MANAGEMENT WITH  
REFERENCE TO DELHIVERY**

**UNDER THE GUIDANCE OF:**

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**AMITY SCHOOL OF DISTANCE  
LEARNING NOIDA**

## **CERTIFICATE-I**

This is to certify that the project entitled “**A Study of Supply Chain Management with reference to Delhivery**” is a bonafide work carried out by **Mr. Ashish Maletha**, under the guidance of **Ms. Princy Arora** in fulfillment of requirement of award of MBA by ASODL, Noida.

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## **CERTIFICATE - II**

This is to certify that **Mr. Ashish Maletha** has planned and conducted the project entitled **“A Study of Supply Chain Management with reference to Delhivery”** under my guidance and supervision and the report submitted therewith was the result of bonafide work done by him.

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**Ashish Maletha**

## CONTENT

<b>Sl. No.</b>	<b>Contents</b>	<b>Page No.</b>
	Executive Summary .....	1
1.	Introduction .....	3
2.	Company Profile .....	5
2.	Literature Review .....	12
4.	Objectives and Scope of the Study .....	44
5.	Research Methodology .....	45
6.	Data Analysis.....	46
7.	Conclusion & Suggestions .....	57
8.	Bibliography/References.....	60
9.	Appendix – Copy of Questionnaire .....	61

## **EXECUTIVE SUMMARY**

The management of such a network requires mastery of optimization logistics, or the specific quantity of a good needed at a particular time and price. Clearly, relationships with suppliers that make up these networks are a central component of successful supply chain management. Increasingly, business school faculty is beginning to recognize the environmental and social issues that add complexity to the supplier-buyer relationship, and hence expand its textbook definition. Buyers, facing public relations pressures in their home countries and looking for opportunities for a competitive advantage, are concerning themselves with supplier employee working conditions and human rights as well as environmental issues, like limiting emissions and packaging waste. But some argue that price and timing pressures from buyers may have contributed to negative conditions at supplier facilities in the first place. Given these dynamics, future business leaders entering the supply chain arena require thorough understanding of methods and metrics of how to accurately assess these relationships.

Today's business climate has rapidly changed and has become more competitive as ever in nature. Businesses now not only need to operate at a lower cost to compete, it must also develop its own core competencies to distinguish itself from competitors and stand out in the market. In creating the competitive edge, companies need to divert its resources to focus on what they do best and outsource the process and task that is not important to the overall objective of the company. SCM has allowed company to rethink their entire operation and restructure it so that they can focus on its core competencies and outsource processes that are not within the core competencies of the company. Due to the current competitive market, it is the only way for a company to survive. The strategy on applying SCM will not only impact their market positioning but also strategic decision on choosing the right partners, resources and manpower. By focusing on core competencies also will allow the company to create niches and specialization of core areas. As stated in the Blue Ocean Strategy outlined by Chan Kim, in order to create a niche for competitive advantage, companies must look at the big picture of the whole process, and figuring out

which process can be reduce, eliminate, raise and create. SCM has allowed business nowadays to not just have productivity advantage alone but also on value advantage. As Martin Christopher in his book, Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service' states, 'Productivity advantage gives a lower cost profile and the value advantage gives the product or offering a differential 'plus' over competitive offerings.' Through maximizing added value and also reduce the cost in the same time, more innovation can be added to the product and process. Mass manufacturing offers productivity advantage but through effective supply chain management, mass customization can be achieved. With mass customization, customers are given the value advantage through flexible manufacturing and customized adaptation. Product life cycles also can be improved through effective use of SCM. Value advantage also changes the norm of traditional offerings that is 'one-size-fits-all.' Through SCM, the more accepted offerings by the industry to the consumers would be a variety of products catered to different market segments and customers preferences.

## **INTRODUCTION**

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a single firm and those where each channel member operates independently. Therefore coordination between the various players in the chain is key in its effective management. Cooper and Ellram (1990) compare supply chain management to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton (stick), but the entire team needs to make a coordinated effort to win the race.

Below is an example of a very simple supply chain for a single product, where raw material is procured from vendors, transformed into finished goods in a single step, and then transported to distribution centers, and ultimately, customers. Realistic supply chains have multiple end products with shared components, facilities and capacities. The flow of materials is not always along an arborescent network, various modes of transportation may be considered, and the bill of materials for the end items may be both deep and large.

To simplify the concept, supply chain management can be defined as a loop: it starts with the customer and ends with the customer. All materials, finished products, information, and even all transactions flow through the loop. However, supply chain management can be a very difficult task because in the reality, the supply chain is a complex and dynamic network of facilities and organizations with different, conflicting objectives.

Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.



Unlike commercial manufacturing supplies, services such as clinical supplies planning are very dynamic and can often have last minute changes. Availability of patient kit when patient arrives at investigator site is very important for clinical trial success. This results in overproduction of drug products to take care of last minute change in demand. R&D manufacturing is very expensive and overproduction of patient kits adds significant cost to the total cost of clinical trials. An integrated supply chain can reduce the overproduction of drug products by efficient demand management, planning, and inventory management.

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. These organizations have their own objectives and these are often conflicting. Marketing's objective of high customer service and maximum sales dollars conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organization---there were as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such integration can be achieved.

## COMPANY PROFILE



Delhivery is an E-commerce logistics service company based out of Gurgaon. Gurgaon-based logistics company SSN Logistics Pvt Ltd, which runs the web platform Delhivery.com. The company was started by a bunch of engineers including Bhavesh Manglani, Kapil Bharati, Mohit Tandon, Sahil Barua and Suraj Saharan. It offers a full suite of services such as last-mile delivery, third-party and transit warehousing, reverse logistics, payment collection, vendor-to-warehouse and vendor-to-customer shipping and more. The company is backed by Times Internet Ltd, which had acquired a minority stake in the firm in June 2016.

### **History**

#### **2011**

- **May:** Founded Delhivery
- **June:** Launched express logistics services in Delhi NCR

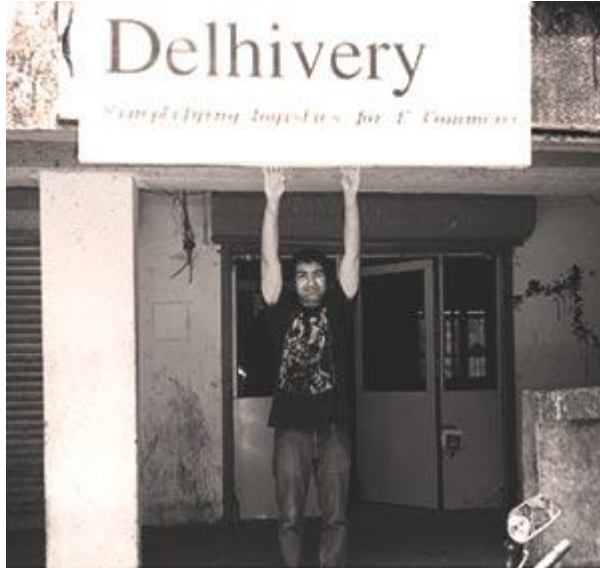


- Months of planning, optimisation and implementation led to the first facility
- **December:** Delivering 500+ shipments per day for 5 e-commerce clients in Delhi NCR
- **Team size:** 150+

2012



- True to the name - first step towards a brand, how very Delhi!
- **April:** Raised Series-A round of funding from Times Internet Limited
- Launched fulfilment services in Delhi and Chennai with 10,000+ sq ft of fulfilment space
- Processed upto 50,000 shipments a month delivering upto 9,000 shipments a day.



- Re-branding the collection centers.
- **Team size:** 1,000+

## 2013

- Express logistics services expanded to 130+ cities
- Fulfilment services expanded to 3 cities with 40,000+ sq ft of fulfilment space



- Our tech and engineering teams put their heads together to map out the layout for smoothest navigation.

- **September:** Raised Series-B round of funding from Times Internet Limited and Nexus Venture Partners



- Opened doors to a new era. Our new office
- Launched suite of commerce technology including Vendor Panel, Godam, FALCON
- **Team size:** 2,500+

## **2014**

- Express logistics services expanded to 175+ cities in India
- 6 fulfilment centers with 2,50,000 sqft of space to offer Delhivery Fulfilment Services across India
- Expansion of processing capacity to over 2,50,000 shipments/day



- September: Series C funding by Renuka Ramnath led private equity firm Multiples Alternate Asset Management with participation from existing investors Nexus Venture Partners and Times Internet Limited.
- **Team size:** 5,000+

## 2015

- Express logistics services expanded to 350+ cities
- 16 fulfilment centers with 1 million sqft of warehousing including first FC in Dubai for cross border fulfilment
- Expansion of processing capacity to over 1.2 million shipments/day
- April: Series D funding led by Tiger Global Management with participation from existing investors
- **Team size:** 15,000+

## 2016

- Services availed by 3000+ clients including 150 of India's largest offline brands
- Introduced our less-than-truckload and full-truckload-freight services
- **Team size:** 15,000+
- #100 Million
- 100 million Shipments completed



## **2017**

- Expansion into 9000+ pincodes and 800+ cities
- Investment from Carlyle, Tiger Global and Fosun
- **Team size:** 15,000+

## **Our Mission & Vision**

### **Enabling Digital Commerce**

Our aim is to become India's largest and most profitable fulfilment company for digital commerce. We bring reach, speed and the power of our customizable technology toolkit to your online logistics operations

Driven by our guiding principles of user centricity, enablement and efficiency, we are building the Operating System for digital commerce in India, and beyond

### **User Centricity**

The customer is the heart of our business. We provide products and services with the singular aim of building trust and improving the lives of our 3 primary sets of customers: consumers, small businesses and enterprises

## **Enablement Over Control**

We enable communities to develop around us. We provide access to our products, services and teams to any partner with the desire and ability to further our vision

## **Efficiency Always**

We seek to eliminate all of the information asymmetries and intermediary inefficiencies that prevent our customers from transacting at lowest possible costs



## LITERATURE REVIEW

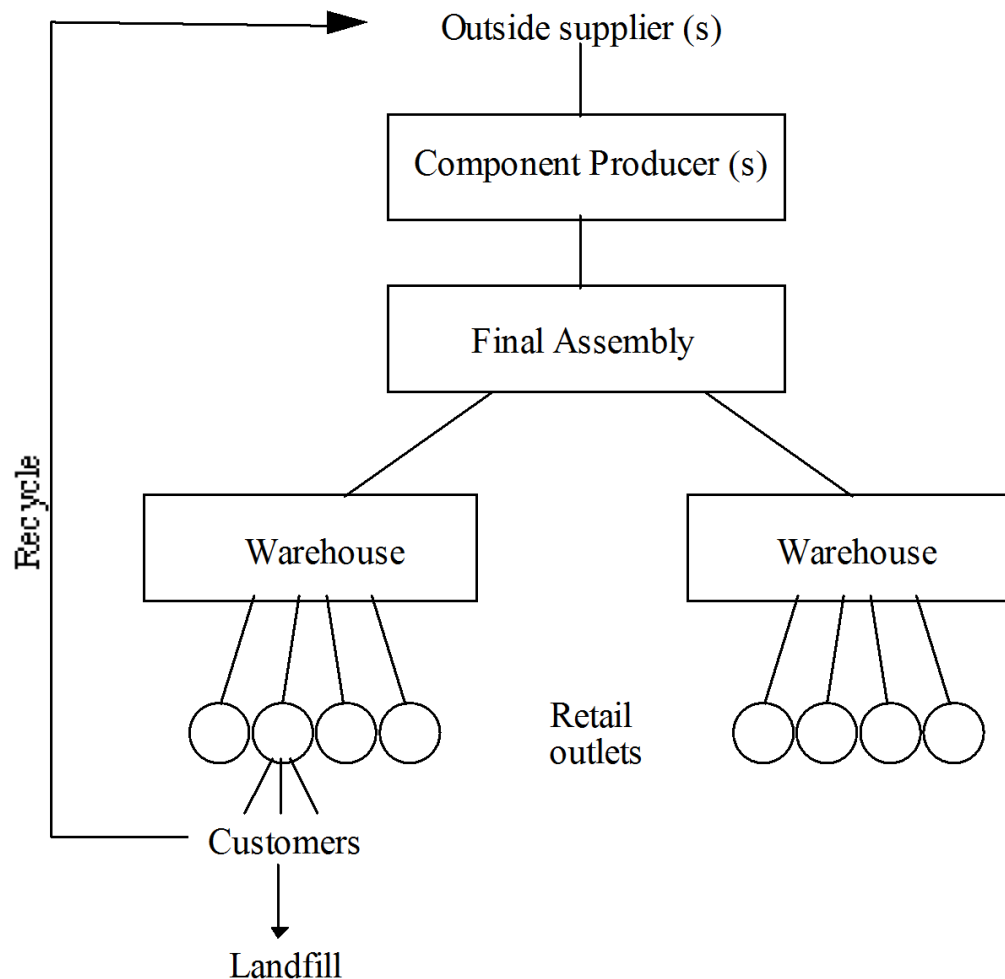
Supply chain management (SCM) is the term used to describe the management of the flow of materials, information, and funds across the entire supply chain, from suppliers to component producers to final assemblers to distribution (warehouses and retailers), and ultimately to the consumer. In fact, it often includes after-sales service and returns or recycling. Below figure is a schematic of a supply chain. In contrast to multiechelon inventory management, which coordinates inventories at multiple locations, SCM typically involves coordination of information and materials among multiple firms. Supply chain management has generated much interest in recent years for a number of reasons. Many managers now realize that actions taken by one member of the chain can influence the profitability of all others in the chain. Firms are increasingly thinking in terms of competing as part of a supply chain against other supply chains, rather than as a single firm against other individual firms.

Also, as firms successfully streamline their own operations, the next opportunity for improvement is through better coordination with their suppliers and customers. The costs of poor coordination can be extremely high. In the Italian pasta industry, consumer demand is quite steady throughout the year. However, because of trade promotions, volume discounts, long lead times, full-truckload discounts, and end-of-quarter sales incentives the orders seen at the manufacturers are highly variable. In fact, the variability increases in moving up the supply chain from consumer to grocery store to distribution center to central warehouse to factory, a phenomenon that is often called the bullwhip effect. The bullwhip effect has been experienced by many students playing the “Beer Distribution Game.” The costs of this variability are high -- inefficient use of production and warehouse resources, high transportation costs, and high inventory costs, to name a few. Acer America, Inc. sacrificed \$20 million in profits by paying \$10 million for air freight to keep up with surging demand, and then paying \$10 million more later when that inventory became obsolete. It seems that integration, long the dream of management gurus, has finally been sinking into the minds of western managers. Some would argue

that managers have long been interested in integration, but the lack of information technology made it impossible to implement a more “systems-oriented” approach. Clearly industrial dynamics researchers dating back to the 1950’s they have maintained that supply chains should be viewed as an integrated system. With the recent explosion of inexpensive information technology, it seems only natural that business would become more supply chain focused. However, while technology is clearly an enabler of integration, it alone can not explain the radical organizational changes in both individual firms and whole industries. Changes in both technology and management theory set the stage for integrated supply chain management. One reason for the change in management theory is the power shift from manufacturers to retailers. Wal-Mart, for instance, has forced many manufacturers to improve their management of inventories, and even to manage inventories of their products at Wal-Mart. While integration, information technology and retail power may be key catalysts in the surge of interest surrounding supply chains, eBusiness is fueling even stronger excitement. eBusiness facilitates the virtual supply chain, and as companies manage these virtual networks, the importance of integration is magnified.

Firms like Amazon.com are superb at managing the flow of information and funds, via the Internet and electronic funds transfer. Now, the challenge is to efficiently manage the flow of products. Some would argue that the language and metaphors are wrong. “Chains” evoke images of linear, unchanging, and powerless. “Supply” feels pushy and reeks of mass production rather than mass customization. Better names, like “demand networks” or “customer driven webs” have been proposed by many a potential book author hoping to invent a new trend. Yet, for now, the name “supply chain” seems to have stuck. And under any name, the future of supply chain management appears bright.

## A Schematic of a Supply Chain



### Key Components of Supply Chain Management:

Supply chain management is an enormous topic covering multiple disciplines and employing many quantitative and qualitative tools. Within the last few years, several textbooks on supply chain have arrived on the market providing both managerial overviews and detailed technical treatments. He is an extensive collection of research papers while they have a collection papers on teaching supply chain management. Also, there are several casebooks that give emphasis to global management issues including. To help order our discussion, we have divided supply chain management into twelve areas. It is identified these twelve areas from their own experience teaching and

researching supply chain management, from analysis of syllabi and research papers on supply chain, and from our discussions with managers. Each area represents a supply chain issue facing the firm. For any particular problem or issue, managers may apply analysis or decision support tools. For each of the twelve areas, we provide a brief description of the basic content and refer the reader to a few research papers that apply. They also mention likely Operations Research based tools that may aid analysis and decision support. We do not provide an exhaustive review of the research literature, but rather provide a few references to help the reader get started in an area. For a more

**The twelve categories we define are:**

- location
- transportation and logistics
- inventory and forecasting
- marketing and channel restructuring
- sourcing and supplier management
- information and electronic mediated environments
- product design and new product introduction
- service and after sales support
- reverse logistics and green issues
- outsourcing and strategic alliances
- Metrics and incentives global issues.

**Location** pertains to both qualitative and quantitative aspects of facility location decisions. This includes models of facility location, geographic information systems (GIS), country differences, taxes and duties, transportation costs associated with certain

locations, and government incentives. Exchange rate issues fall in this category, as do economies and diseconomies of scale and scope. Decisions at this level set the physical structure of the supply chain and therefore establish constraints for more tactical decisions. Binary integer programming models play a role here, as do simple spreadsheet models and qualitative analyses. There are many advanced texts specially dedicated to the modeling aspects of location and most books on logistics also cover the subject. It is present a substantial treatment of GIS while issues of taxes, duties, exchange rates, and other global location issues. It is examine several software products that provide optimization tools for solving industrial location problems.

The **transportation and logistics** category encompasses all issues related to the flow of goods through the supply chain, including transportation, warehousing, and material handling. This category includes many of the current trends in transportation management including vehicle routing, dynamic fleet management with global positioning systems, and merge-in-transit. Also included are topics in warehousing and distribution such as cross docking and materials handling technologies for sorting, storing, and retrieving products. Because of globalization and the spread of outsourced logistics, this category has received much attention in recent years. However, we will define a separate category to examine issues specifically related to outsourcing and logistics alliances. Both deterministic (such as linear programming and the traveling salesman problem) and stochastic optimization models (stochastic routing and transportation models with queuing) often are used here, as are spreadsheet models and qualitative analysis. Recent management literature has examined the changes within the logistics functions of many firms as the result of functional integration.

**Inventory and forecasting** includes traditional inventory and forecasting models. Inventory costs are some of the easiest to identify and reduce when attacking supply chain problems. Simple stochastic inventory models can identify the potential cost savings from, for example, sharing information with supply chain partners, but more complex models are required to coordinate multiple locations. A few years ago, multiechelon inventory theory captured most of the research in this area that would apply to supply chains. However, in nearly every case, multiechelon inventory models assume a

single decision-maker. Supply chains, unfortunately, confront the problem of multiple firms, each with its own decision-maker and objectives. Of course there are many full texts on the subject such as. They perform one of the earliest studies in serial systems with probabilistic demand. They introduce the concept of an imputed penalty cost, wherein a shortage at a higher echelon generates an additional cost. This cost enables us to decompose the multiechelon system into a series of stages so that, assuming centralized control and the availability of global information, the ordering policies can be optimized. Both propose performance measurement schemes for individual managers that allow for decentralized control (so that each manager makes decisions independently), and in certain instances, local information only. The result is a solution that achieves the same optimal solution as if we assumed centralized control and global information.

**Marketing and channel restructuring** includes fundamental thinking on supply chain structure and covers the interface with marketing that emerges from having to deal with downstream customers. While the inventory category addresses the quantitative side of these relationships, this category covers relationship management, negotiations, and even the legal dimension. Most importantly, it examines the role of channel management and supply chain structure in light of the well-studied phenomena of the bullwhip effect that was noted in the introduction. The bullwhip effect has received enormous attention in the research literature. Many authors have noted that central warehouses are designed to buffer the factory from variability in retail orders. The inventory held in these warehouses should allow factories to smooth production while meeting variable customer demand. However, empirical data suggests that exactly the opposite happens. In other words, the bullwhip effect is real. Typically causes include those noted in the introduction, as well as the fact that retailers and distributors often over-react to shortages by ordering more than they need. It is show how four rational factors help to create the bullwhip effect: demand signal processing (if demand increases, firms order more in anticipation of further increases, thereby communicating an artificially high level of demand); the rationing game (there is, or might be, a shortage so a firm orders more than the actual forecast in the hope of receiving a larger share of the items in short supply); order batching (fixed costs at one location lead to batching of orders); and manufacturer price variations (which encourage bulk orders). The latter two factors generate large orders that are followed by

small orders, which imply increased variability at upstream locations. Some recent innovations, such as increased communication about consumer demand, via electronic data interchange (EDI) and the Internet, and everyday low pricing (EDLP) (to eliminate forward buying of bulk orders), can mitigate the bullwhip effect. <sup>6</sup> In fact, the number of firms ordering, and receiving orders, via EDI and the Internet is exploding. The information available to supply chain partners, and the speed with which it is available, has the potential to radically reduce inventories and increase customer service. <sup>7</sup> Other initiatives can also mitigate the bullwhip effect. For example, changes in pricing and trade promotions and channel initiatives, such as vendor managed inventory (VMI), coordinated forecasting and replenishment (CFAR), and continuous replenishment, can significantly reduce demand variance.

Vendor Managed Inventory is one of the most widely discussed partnering initiatives for improving multi-firm supply chain efficiency. Popularized in the late 1980s by Wal-Mart and Procter & Gamble, VMI became one of the key programs in the grocery industry's pursuit of "efficient consumer response" and the garment industry's "quick response." Successful VMI initiatives have been trumpeted by other companies in the United States, including Campbell Soup and Johnson & Johnson, and by European firms like Barilla (the pasta manufacturer). In a VMI partnership, the supplier—usually the manufacturer but sometimes a reseller or distributor—makes the main inventory replenishment decisions for the consuming organization. This means the supplier monitors the buyer's inventory levels (physically or via electronic messaging) and makes periodic resupply decisions regarding order quantities, shipping, and timing. Transactions customarily initiated by the buyer (like purchase orders) are initiated by the supplier instead. Indeed, the purchase order acknowledgment from the supplier may be the first indication that a transaction is taking place; an advance shipping notice informs the buyer of materials in transit. Thus the manufacturer is responsible for both its own inventory and the inventory stored at its customers' distribution centers. Because many of these initiatives involve channel partnerships and distribution agreements, this category also contains important information on pricing, along with anti-trust and other legal issues. These innovations require interfirm, and often intrafirm, cooperation and coordination that can be difficult to achieve.

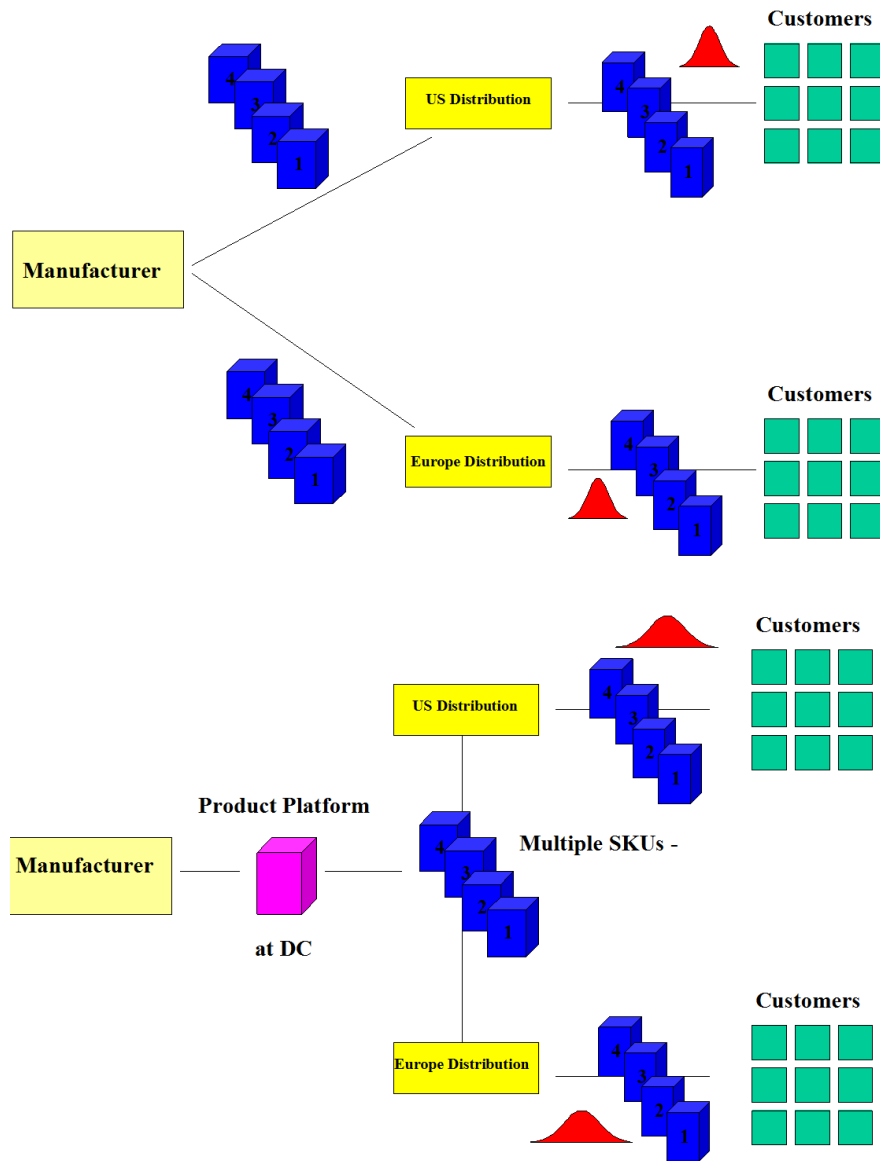
While marketing focuses downstream in the supply chain, **sourcing and supplier management** looks upstream to suppliers. Make/buy decisions, fall into this category, as does global sourcing (Little (1995) and Pyke (1994)). The location category addresses the location of a firm 's own facilities, while this category pertains to the location of the firm 's suppliers. Supplier relationship management falls into this category as well. Some firms are putting part specifications on the web so that dozens of suppliers can bid on jobs. GE, for instance, has developed a trading process network that allows many more suppliers to bid than was possible before. The automotive assemblers have developed a similar capability; and independent Internet firms, such as Digital Market, are providing services focused on certain product categories. Other firms are moving in the opposite direction by reducing the number of suppliers, in some cases to a sole source. Determining the number of suppliers and the best way to structure supplier relationships is becoming an important topic in supply chains. Much of the research in this area makes use of game theory to understand supplier relationships, contracts, and performance metrics.

The **information and electronic** mediated environments category addresses long-standing applications of information technology to reduce inventory and the rapidly expanding area of electronic commerce. Often this subject may take a more systems orientation, examining the role of systems science and information within a supply chain. Such a discussion naturally focuses attention on integrative ERP software such as SAP, Baan and Oracle, as well as supply chain offerings such as i2 's Rhythm and Peoplesoft 's Red Pepper. The many supply chain changes wrought by electronic commerce are particularly interesting to examine, including both the highly publicized retail channel changes (like Amazon.com) and the more substantial business to business innovations (like the GE trading process network). It is here that we interface most directly with colleagues in information technology and strategy, which again creates opportunities for cross-functional integration.

Product design and new product introduction deal with design issues for mass customization, delayed differentiation, modularity and other issues for new product introduction. With the increasing supply chain demands of product variety, there is an



increasing body of research available. One of the most exciting applications of "supply chain thinking" is the increased use of postponed product differentiation. Traditionally, products destined for world markets would be customized at the factory to suit local market tastes. While a customized product is desirable, managing worldwide inventory is often a nightmare. Using postponement the product is redesigned so that it can be customized for local tastes in the distribution channel. The same generic product is produced at the factory and held throughout the world.

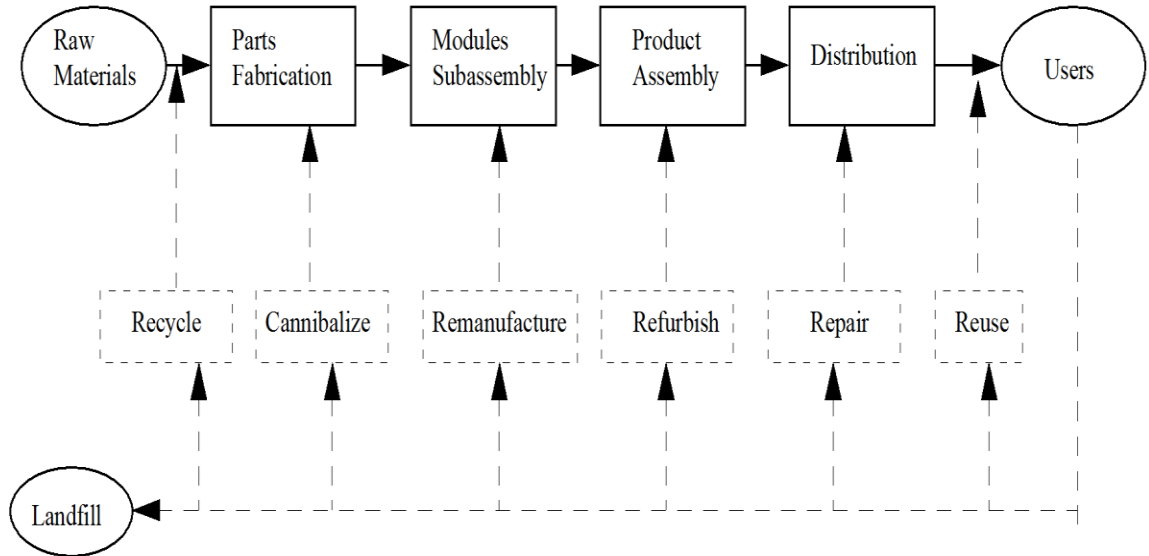


For these problems, we find an interface with engineering and development, with clear implications for product cost and inventory savings. Stochastic inventory models are often used to identify some of the benefits of these initiatives. Also important are issues related to product design, managing product variety and managing new product introduction and product rollover.

The **service and after sales support** category addresses the critical, but often overlooked, problem of providing service and service parts. Some leading firms, such as Saturn and Caterpillar, build their reputations on their ability in this area, and this capability generates significant sales. Stochastic inventory models for slow-moving items fall into this category, and there are many papers on this topic related to inventory management and forecasting. While industry practice still shows much room for improvement, several well-known firms have shown how spare parts can be managed more effectively.

**Reverse logistics and green** issues are emerging dimensions of supply chain management. This area examines both environmental issue and the reverse logistics issues of product returns. Because of legislation and consumer pressure, the growing importance of these issues is evident to most managers. Managers are being compelled to consider the most efficient and environmentally friendly way to deal with product recovery, and researchers have begun significant effort in modeling these systems. The term “product recovery” encompasses the handling of all used and discarded products, components and materials. It is note that product recovery management attempts to recover as much economic value as possible, while reducing the total amount of waste. They also provide a framework and a set of definitions that can help managers think about the issues in an organized way. These authors examine the differences among various product recovery options including repair, refurbishing, remanufacturing, cannibalization, and recycling. The whole process of manufacturing begins, of course, with product design. Today, firms are beginning to consider design for the environment (DFE) and design for disassembly (DFD) in their product development processes. Unfortunately, AT&T discovered that designing products for reuse can result in more materials and complexity, thereby violating other environmental goals.

## Product Recovery Options



The analysis of the recovery situation is considerably more complicated than that of consumables. Normally, in a recovery situation some items cannot be recovered, so the number of units demanded is not balanced completely by the return of reusable units. Thus, in addition to recovered units, a firm must also purchase some new units from time to time. Consequently, even at a single location, there are five decision variables: (1) how often to review the stock status, (2) when to recover returned units, (3) how many to recover at a time, (4) when to order new units, and (5) how many to order. When there are multiple locations, the firm must decide how many good units to deploy to a central warehouse, and how many to deploy to each retailer or field stocking location. With consumable items the lead time to the retailers is a transportation time from the warehouse plus a random component, depending on whether the warehouse has stock. With recoverable items, the lead time is the transportation time plus the time to recovery, if the warehouse does not have stock. So in some cases the two systems can be treated in almost the same way. However, if the recovery facility has limited capacity, or if the number of items in the system is small, the systems will differ significantly. For example, if many items have failed and are now in recovery, they cannot be in the field generating failures. Therefore, the demand rate at the warehouse will decline. In a consumable system, it is usually assumed that the demand rate does not depend on how many items

have been consumed. Most of the research in this area relevant to this article concerns products and packaging after manufacturing has been completed. For example, a large U. S. chemical company gained significant market share in water treatment chemicals by delivering its products in reusable containers. The customers (hospitals and other large institutions, for example) need never touch the chemicals or deal with the disposal of used containers. This problem has been addressed by, among others. Some products that are not reused as is can be disassembled so that some of the parts can be used in remanufactured products. Report on a model developed in connection with a manufacturer of reprographic equipment. There is a single location with two types of inventory: serviceable and repairable. Demands for serviceable units and returns of repairable units occur probabilistically, specifically, according to independent Poisson processes with rates, respectively (where  $f$  is a fraction). In addition, repairs are done on a continuous, first come-first served basis (for example, at a local machine shop).

Outsourcing and strategic alliances examines the supply chain impact of outsourcing logistics services. With the rapid growth in third party logistics providers, there is a large and expanding group of technologies and services to be examined. These include fascinating initiatives such as supplier hubs managed by third parties. The rushes to create strategic relationships with logistics providers and the many well-published failures have raised questions about the future of such relationships. In any case, outsourcing continues to raise many interesting issues.

Metrics and incentives examine measurement and other organizational and economic issues. This category includes both measurement within the supply chain and industry benchmarking. Because metrics are fundamental to business management, there are many reading materials outside of the supply chain literature, including accounting texts for instance. Several recent articles concentrate on the link between performance measurement and supply chain improvement. Finally, global issues examine how all of the above categories are affected when companies operate in multiple countries. This category goes beyond country specific issues, to encompass issues related to cross boarder distribution and sourcing. For example, currency exchange rates, duties & taxes, freight forwarding, customs issues, government regulation, and country comparisons are

all included. Note that the location category, when applied in a global context, also addresses some of these issues.

Studies on supply chain management suggest that the scope of business processes being coordinated across supply chains is broad. It is determined the scope of processes that are being integrated across organizational borders and indicated that a large number of companies that practice supply chain management are attempting to integrate logistics, marketing, and operations-oriented processes across supply chains. They extended the scope of SCM beyond material management, partnership, information technology to the Total Quality Management areas like management commitment, organizational structure, training and behavioral issues. As firms' survival lies on integration, a good understanding of the integration process is a key aspect in SCM. It is that studied how to integrate the supply chain management business process .It is concluded that the level of investments to supply chain partners, the degree of dependence between supply chain partners, and the level of product salability of manufacturer would enhance commitment and, consequently, the integration of the SCM business process. We provided a theoretical framework and proposed the theoretical as well as empirical reasons for enhancing the underlying logic of process integration in supply chain management to capture pooled and reciprocal interdependencies. It is discussed that basic hypothesis “the more integration (wider the scope) – the better the management of the chain” is not always true and proved that it depends very much on the “environment” of the supply chain and the power relations between the participants in the supply chain. They discussed strategy formulation, identified decision-making areas for improving material flow, and finally performance evaluation in order to determine how well the supply chain initiative has been implemented. Authors proposed a set of management techniques and tools to analyze successful SCM strategies. As traditional supply chain too often, is a sequence of weakly connected activities both within and outside the organization and leads to many misalignments. It is presented a coordination framework, to align the inventory decisions in decentralized supply chains. The framework was based on multi-agent technology, coordination theory, and optimization technology.

### **Three operational successes:**

Cost control and operational efficiency:

Cost and profitability drivers are of the utmost importance in First source solution. With wafer-thin margins of two to three percent, managing costs is an ongoing challenge for them. Supply chain can help their managers in sales, marketing, customer support, supply chain planning and financials understand and respond to key issues, such as:

- Correctly analyzing barriers to market-entry, which vary widely with each product
- Responding to competition within a well defined supply tier structure
- Dealing with the high threat of product substitutes
- Continually driving product innovation
- Managing product lifecycles to maximize returns

Managing costs is one of the most critical elements of profitability in business process outsourcing industry. However, a closer look at the elements of supply chain management might reveal that procurement and information management most significantly impact costs. For example:

- Breakdowns in the procurement and information management process can have a costly ripple effect throughout the supply chain
- Procurement and outsourcing management processes are a high contributor to the product cost structure, opening opportunities for cost management
- IT companies have a high degree of control over managing suppliers

### **Three operational failures:**

They look to reduce costs, shorten cycle time, improve shareholder value, decrease inventory, and focus on core competencies, gain information technology, increase expertise and more. Likewise transport, warehouse, forwarder and other logistics service providers want to provide outsource services. They want to improve profits, transition from being a commodity service provider, gain volumes and throughput by leveraging existing core logistics service, increase revenues and more. This creates a mutual need between the two parties. Yet despite this common interest, half of the outsourcing relationships end unsatisfactorily within three years. Half are not able to go beyond a buyer-seller relationship.

The responsibility for the failure often resides with both parties. Reasons for the failures run the gamut and include:

- Poor project design
- Lack of metrics or key performance indicators
- Use of improper metrics
- Not fulfilling expectations of either or both parties
- No clear lines of responsibility and accountability
- Inability to evolve the relationship from short term to long term and from static to dynamic

Some reasons for failure reflect symptoms, not causes. Failures are not unique to outsourcing; but outsourcing is unique. Outsourcing goes beyond transport or warehouse agreements and service. Supply chain management is one of largest costs and has significant service impact to First Source Solution. Some contract logistics projects are critical to a company's supply chain and operating success. Therefore outsourcing should be designed not to fail, especially with supply chain management. The impact can be significant to the company doing the outsourcing.

Much is discussed about metrics and service level agreements in defining the outsourcing relationship. These should be after-the-fact and matter-of-fact results of the project definition and design. Whether the two parties are trying to develop the contract logistics relationship or are striving to make an existing outsourced program succeed, there are three fundamental issues that must be addressed.

- Expectations are not reasonable. The litmus test of reasonableness should be used to identify risks for each party. Expectations must be known as to where they are and why. They must be tangible. The timing of occurrence and impact should reflect transition, ramp up and learning curve.
- Potential conflict may exist initially between buyer and seller. This means incompatibility with goal congruence. The basic foundation is between buyer and seller. Moving to mutual beneficial development and direction can be hindered—or not—with this basic issue.
- Supply chain management is a process that crosses the company. This can put outsourcing and contract logistics provider in conflict with the traditional organization silos.

Outsourcing of supply chain management should be designed and developed to succeed. Both parties must take the dialogue deeper. Whether it develops into a partnership depends on mutuality. The three issues frame and drive the relationship, its direction, purpose and its continuity. It should be based on a prudent, rational, open exchange between the firm wanting to outsource and the firm wanting to handle the outsourcing. There should be no rush to judgment and have no artificial deadlines for completion. All this increases the chances for success. Supply chain in outsourcing business is too important to fail.

**Weakness in supply chain management:**

The supply chain is made up of all the activities that are required to deliver products to the customer - - from designing product to receiving orders, procuring materials, marketing, manufacturing, logistics, customer service, receiving payment and so on.



Anyone, anything, anywhere that influences a product's time-to-market, price, quality, information exchange, delivery, among other activities is part of the supply chain.

There is no doubt about the heavy emphasis on e-Commerce and e-Supply Chain activities. Large staffs, big information technology investments and other resources have been deployed to create sophisticated e-supply chains. The scope of these e-supply chains will include everything from product development, Supply Chain Management, marketing, sales and accounting activities. Suppliers, regardless of size, should have received the signal loud and clear...*the e- Supply Chain has arrived*. Even more intriguing is the rapid evolution of the digital marketplace which allows buyers and sellers to transact in a single intelligent, multidimensional marketplace that connects multiple trading exchanges. This allows buyers to consolidate orders from multiple vendors and subsequently provide for the effective integration of the final logistical activities. Putting intelligence into super portals so customers can get their information their way is essential. Management, across all industries, will need to embrace collaboration with customers and suppliers in the planning and replenishment process. As customers and suppliers band together in mutually beneficial partnerships, the need for better Supply Chain Management processes and systems is very evident and a very high business priority. For many companies, it has become clear that a supply chain that flows information and material best can be a significant competitive differentiator. All the way to the boardroom, improving Supply Chain Management is getting lots of attention because forward-thinking managements know it is the best strategy to increase market share, reduce costs, minimize inventories and, of course, improve profits. In many industries, market share will be won and lost based on supply chain performance. With the stakes so high, there is a frenzy of activity along the supply chain front. Executives are assessing how their companies do business, especially in supply chain activities. They often find dysfunctional sets of policies, processes, systems and measurements. And these exist at all points in the supply chain, including business partners. The existence of a "company of silos" becomes apparent and, most importantly, a new clarity of needs and goals emerges for Supply Chain Management. There is a need to transform from dysfunctional and un-synchronized decision-making - which results in disintegrated and

very costly supply activities - to a supply chain that performs in such a way that it is one of the company's competitive advantages.

### **Information Technology and Information Management:**

The advent of the Internet and electronic communication has enabled Firstsource solution to be more responsive to their customers than ever. Current developments and the rationale for IT integration by analyzing the problems of enterprise resource planning (ERP), electronic data interchange (EDI) and presented the solutions of SCM. Authors provided insights into the adoption of systems and the impacts on organizational performance. There were no significant performance differences found between ERP adopters and non-adopters, either at the business process level, or at the overall firm level. Although it was confirmed that the rich experience of firms with ERPs, tends to deliver higher overall performance, but no evidence was found of a similar effect on supply chain performance. On the contrary EDI adopters perceived more operational benefits, more external pressure and mutual understanding, and fewer technical and organizational difficulties than non-adopters of EDI. Shore

### **Customer - Supplier Relationship Management:**

Customer satisfaction is absolute for staying abreast in competitive environment that can be achieved only by quickly responding to customer needs. Efficient consumer response (ECR) is a supply chain management strategy that attempts to address the inefficiencies in the supply chain. It is discussed efficient consumer response (ECR) as a supply chain strategy by analyzing the adoption of ECR strategy in some industries. Furthermore, a management action plan is presented for future adoption of ECR strategy by similar business operations in First source solution. Authors recommended flexible supply chain by involving change in layouts, establishing faster set-ups and by developing partnership with vendors for quicker response.

The advent of the Internet allows electronic communication with suppliers regarding matters of stock availability, ordering and delivery without the associated costs of Electronic Data Interchange. As a result Firstsource solution can deal with a larger

network of suppliers. They examine the relationship between suppliers and manufacturers, and the effectiveness of business to business (B2B) e-commerce implementations. The results indicated that there is a clear link established between effective management of human resources and effective implementation of B2B e-commerce. They proposed conceptual model including behavioral dimensions of supplier-dealer relationships and presented hypotheses about how to achieve satisfactory inter-organizational relationships. It is concluded that long-term relationships between customer and supplier can lead to higher satisfaction. They provided a framework for developing supply chain metrics that translates performance into shareholder value. The framework emphasized on managing the interface between customer relationship management and supplier relationship management at each link in the supply chain.

### **Knowledge Management:**

A stronger emphasis on knowledge management as part of business strategy may help supply managers to manage uncertainty better. They proposed a framework of knowledge management and “e-knowledge networks” in inter-organizational systems to support organizational collaboration. It is observed that establishing internal knowledge management systems for organization creates opportunities to minimize knowledge isolation in functional departments and creates a greater base for tacit learning to be leveraged. On the other hand external knowledge management systems bring value chain members closer together and add value to the product (i.e. increased quality, customer perceptions of brand platforms) throughout the value chain. It is found that only knowledge management is many times inadequate for managing a supply network in uncertain environment hence a new approach – called the “intelligence handbook” was proposed to discover operational intelligence in order to map knowledge in a supply network with uncertainty. The impact of organizational structure in knowledge transfer and utilization among the different participating functions in the perspective of systems theory. Authors then exploit the rational behind an effective process of knowledge movement in any organization, and the probable factors that influence such movements.

“Supply chain management is the continuous planning, developing, controlling, informing and monitoring of actions within and between supply chain links so that an integrated supply process results which meets overall strategic goals.” Supply chains are not linear; rather, any organization has several supply chains coming into (upstream), going through and going out of (downstream) the organization. Supply chain management is the management of the whole demand process, starting with the end customers' requirements - be that external customers (e.g. consumers) or internal customers (e.g. end users) - and managing the meeting of their requirements right up to, and in some cases, beyond the supplier of the required goods or services. Few organizations have fully integrated their supply chains; one example of where supply chain management has been successfully implemented is in the automotive sector where

Nissan, the car manufacturer, has integrated its upstream supply chains - certainly for its car production if not for its entire business. The supermarket sector is an excellent example of where the supply chains close to the final customer have been managed to the extent that all goods and services required by the organization are demand-driven, with technology enabling end-customers' requirements to be communicated direct to suppliers. CIPS encourages organizations to manage their supply chains for both direct spend i.e. those goods and services required for the business (components for a manufacturing process for example), as well as indirect spend i.e. those goods and services required to support the business - professional services for instance. Supply chain management involves identifying where the value lies within the whole supply chain i.e. identifying the value chain and then segmenting it so that each segment can be addressed individually. It is also concerned with analyzing and identifying all the non-value adding activities across the entire supply chain and removing them. This process is sometimes referred to as ‘diagnostics. The purpose of this is to diagnose each value segment to determine whether the organization could improve it whether the value segment could be more enhanced, whether cost could be taken out or whether knowledge about it could be bettered, for instance.

Supply chain management is evolving it is becoming more complicated with many organizations having 80% of their turnover comprising bought-in goods and services.

This trend has been exacerbated by an increase in outsourcing; make/buy decisions resulting in more goods and services being bought in, and longer-term partnering arrangements leading to fewer key suppliers who are more willing to take a greater responsibility for efficient upstream supply chains. Technology, notably eProcurement, eMarket places and eAuctions, are creating new and alternative upstream supply chains which also have to be managed. Some organizations have outsourced their production to their suppliers so that the organization's role becomes one of brand management; this is an example of where supply chain management is critical to the success of an organization. Practical aspects/issues associated with supply chain management within the organization will vary from one organization to another and from one industrial sector to another but a typical list might include:

- Perception by individuals that supply chain management represents a threat; for example, the job profile may change perhaps necessitating new approaches to supplier management
- Suppliers, buyers, manufacturers and sub-contractors may all be at different levels of development
- Upstream - some clients are keen to develop supply chain management but the great majority is price-driven - therefore education as to the benefits of supply chain management is very important
- Board members sponsor the supply chain management program and the work being carried out by the buying teams
- Whole cost rather than lowest price is key
- Supply chain management will only be a success where the relationship is two-way and risk/ profit/opportunities are shared

Supply chain management has a strategic role to play within the organization; it is pivotal because, as stated above, it spans all demand, right from the end-customer's requirement to the suppliers that provide the goods and services to meet that need. Sometimes, supply

chain management involves going beyond the suppliers that interface with the organization to their suppliers, in order that improvements can be made. These may include removing cost, increasing quality or ensuring ethical, environmental or socially responsible inputs. Very few organizations' have worked closely with their suppliers' suppliers; working at more than two suppliers removed is unusual. Supply chain management involves the sharing of risk with suppliers - this can involve moving the risk up the supply chains to those suppliers best able to manage it. Such devolution of risk will come at a cost and so it is to that extent an economic decision. An organization has to determine the right approach to meet its own objectives; it should therefore evaluate the economic drivers to develop an appropriate level of sophistication in respect of its supply chains - this may involve deciding to bear most risks internally. A key competence is sophisticated interpersonal skills e.g. an ability to persuade, influence, communicate, facilitate, coordinate and manage the human implications of change. Another valuable competence is the ability to challenge existing processes, policies, procedures CIPS encourages all purchasing and supply management professionals to continually question and challenge where it is appropriate to do so, and not just within the purchasing dimension. Purchasing and supply management professionals wishing to promote and develop supply chain management must adopt all of the above skills and competencies but most importantly, should be able to think in terms of the whole business. To achieve maximum benefit, supply chain thinking would of course pervade the whole of the company's corporate strategy; supply chain considerations would be as integral a part as Marketing, Production or Finance.

### **Location Decisions:**

The geographic placement of production facilities, stocking points, and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources to a long-term plan. Once the size, number, and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost, and level of service. These decisions should be determined by an

optimization routine that considers production costs, taxes, duties and duty drawback, tariffs, local content, distribution costs, production limitations, etc. for a thorough discussion of these aspects.) Although location decisions are primarily strategic, they also have implications on an operational level.

### **Production Decisions:**

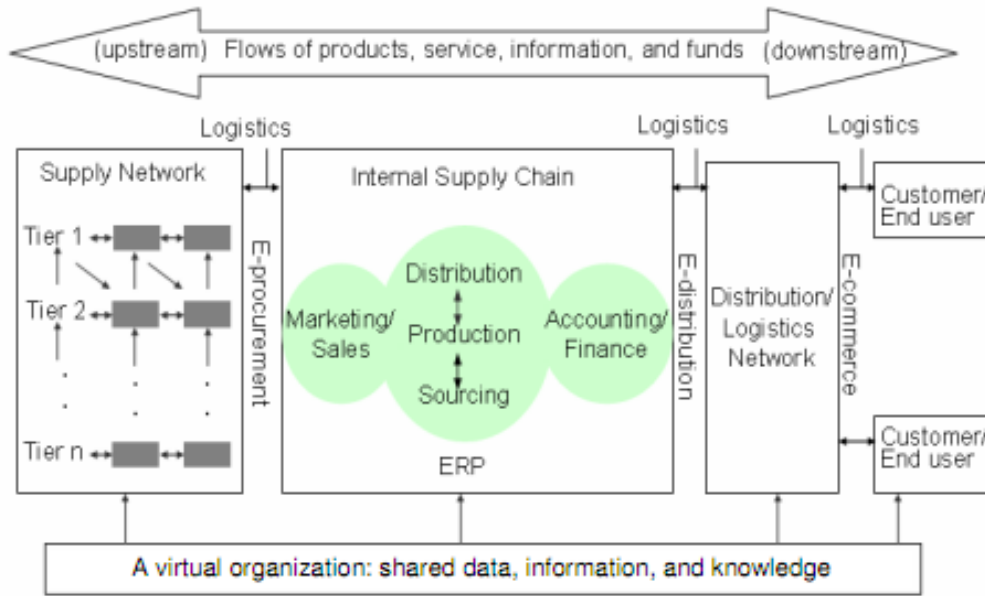
The strategic decisions include what products to produce, and which plants to produce them in, allocation of suppliers to plants, plants to DC's, and DC's to customer markets. As before, these decisions have a big impact on the revenues, costs and customer service levels of the firm. These decisions assume the existence of the facilities, but determine the exact path(s) through which a product flows to and from these facilities. Another critical issue is the capacity of the manufacturing facilities--and this largely depends the degree of vertical integration within the firm. Operational decisions focus on detailed production scheduling. These decisions include the construction of the master production schedules, scheduling production on machines, and equipment maintenance. Other considerations include workload balancing, and quality control measures at a production facility.

### **Inventory Decisions:**

These refer to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw material, semi-finished or finished goods. They can also be in-process between locations. Their primary purpose to buffer against any uncertainty that might exist in the supply chain, since holding of inventories can cost anywhere between 20 to 40 percent of their value, their efficient management is critical in supply chain operations. It is strategic in the sense that top management sets goals. However, most researchers have approached the management of inventory from an operational perspective. These include deployment strategies (push versus pull), control policies --- the determination of the optimal levels of order quantities and reorder points, and setting safety stock levels, at each stocking location.

A Supply Chain encompasses all activities in fulfilling customer demands and requests. These activities are associated with the flow and transformation of goods from the raw materials stage, through to the end user, as well as the associated information and funds flows. There are four stages in a supply chain: the supply network, the internal supply chain (which are manufacturing plants), distribution systems, and the end users. Moving up and down the stages are the four flows: material flow, service flow, information flow and funds flow. E-procurement links the supply network and manufacturing plant, e-distribution links the manufacturing plant and the distribution network, and e-commerce links the distribution network and the end users. The supply chain begins with a need for a computer. In this example, a customer places an order for a Dell computer through the Internet. Since Dell does not have distribution centers or distributors, this order triggers the production at Dell's manufacturing center, which is the next stage in the supply chain. Microprocessors used in the computer may come from AMD and a complementary product like a monitor may come from Sony. Dell receives such parts and components from these suppliers, who belong to the up-stream stage in the supply chain. After completing the order according to the customer's specification, Dell then sends the computer directly to the users through UPS, a third party logistics provider. This responsive supply chain is illustrated in Figure 1. In this supply chain, Dell Computer is the captain of the chain; the company selects suppliers, forges partnerships with other members of the supply chain, fulfills orders from customers and follows up the business transaction with services. Now, consider a case of purchasing a pack of Perdue chicken breast at Sam's Club. When customers buy trays of chicken breast at Sam's Club, the demand is satisfied from inventory that is stocked in a Sam's Club distribution center. Production at a Perdue Farms manufacturing facility is based on forecasted demand using historical sales data. Perdue Farms runs a vertical supply chain starting from the eggs, to the grains that feed chicks proceeding to manufacturing, packaging, and delivery. Packaging materials come from suppliers.





### Supply Chain in e-business environment

Supply Chain Management is a set of synchronized decisions and activities utilized to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers, and customers so that the right product or service is distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying customer service level requirements. The objective of Supply Chain Management (SCM) is to achieve sustainable competitive advantage

Information technology is the key driving force for moving material management to supply chain management in the second half of the 20th century. In 1970, the cost of one megahertz of computing power was \$7,600. By the end of the century, it was 17 cents. The cost of storing one megabit of data was \$5,256 in 1970. It is less than 17 cents now.

Ever since the 1960s, technology has enabled business to create tools to ease the management of materials. The stages of the business model evolution are illustrated in Figure 1.3, with Bill of Materials (BOM) processor in the early 60s, Material Requirement Planning (MRP) in the 70s, Manufacturing Resource Planning (MRPII) in the 80s, Enterprise Resource Planning (ERP) in the 90s, and supply chain management

(SCM) packages in the early twenty-first century. The impact in the evolution of advanced technology and computer power on materials and supply chain management is phenomenal. In the early 1960s, a BOM processor was written on a 1400 disk computer in Milwaukee. In mid 1960, the first use of the computer for planning material was introduced and was named MRP. IBM was the first to introduce MRP software to the market. The significance of MRP is that it identifies what product is required by the customer; compares the requirement to the on-hand inventory level and calculates what items need to be procured and when. By itself, MRP does not recognize the capacity limitation. It will schedule order release even when the capacity is not available. Closed loop MRP was then introduced to include capacity requirement planning as a part of material requirement planning. Advancement of computer capacity makes the extra mathematical computations for capacity planning available and affordable. In the Mid 80's, Manufacturing Resource Planning (MRPII) evolved out of MRP and closed loop MRP. MRPII is a method for the effective planning of all resources of a manufacturing company. MRPII closed the loop not only with the capacity planning and accounting systems but also with the financial management systems. Consequently, all the resource of a manufacturing company could be planned and controlled as the information became more accessible using MRPII. In the 1980s, labor cost decreased and material cost increased due to the automation of production process. Reducing inventory and shortening lead-time became inevitable to survive the competition. Companies searched for new business paradigms that would lead to competitive advantage. Just in Time (JIT), Theory of Constraints (TOC) and Total Quality Management (TQM) are examples of strategies that helped companies to improve production processes, reduce costs and successfully compete in a variety of business environments. This led to the development of ERP systems that give complete visibility to the organization, integrating previously stand-alone systems. ERP became more acceptable during the mid- and late 1990s. ERP is not just MRPII with a new name. ERP is the next logical sophistication level in an evolutionary series of computer tools for material and supply chain management. ERP systems provide an integrated view of information across functions within a company and with the potential to go across companies. In late 90s and the beginning of 21<sup>st</sup> century, electronic communications as opposed to paper transactions allow for a decrease in

amount of lead-time required to replenish inventory. Cutting lead-time minimizes the risk of uncertainty in demand and decreases the probability of over or under-stocking inventory. The 90s marked the wide use of the Internet. This provided great opportunity for companies to integrate E-commerce into their business models. The primary emphasis during that period was business-to-customer (B2C). Today, the emphasis expands to include business-to-business or B2B. Back-end system integration, especially supply chain management provides greater visibility and more strategic capability for companies to improve profitability and competitiveness. Supply chain management models emerged. A supply chain consists of all stages involved, either directly or indirectly, in fulfilling a customer request.

One of the causes of supply chain failure is due to the lack of understanding of the nature of demand. The lack of understanding often leads mismatched supply chain design. Fisher (1997) suggested two distinctive approaches, efficient supply chain and responsive supply chain, to design a firm's supply chain. The purpose of responsive supply chain is to react quickly to market demand. This supply chain model best suites the environment in which demand predictability is low, forecasting error is high, product life cycle is short, new product introductions are frequent, and product variety is high (Table 1.1). The responsive supply chain design matches competitive priority emphasizing on quick reaction time, development speed, fast delivery times, customization, and volume flexibility. The design features of responsive supply chains include flexible or intermediate flows, high-capacity cushions, low inventory levels, and short cycle time.

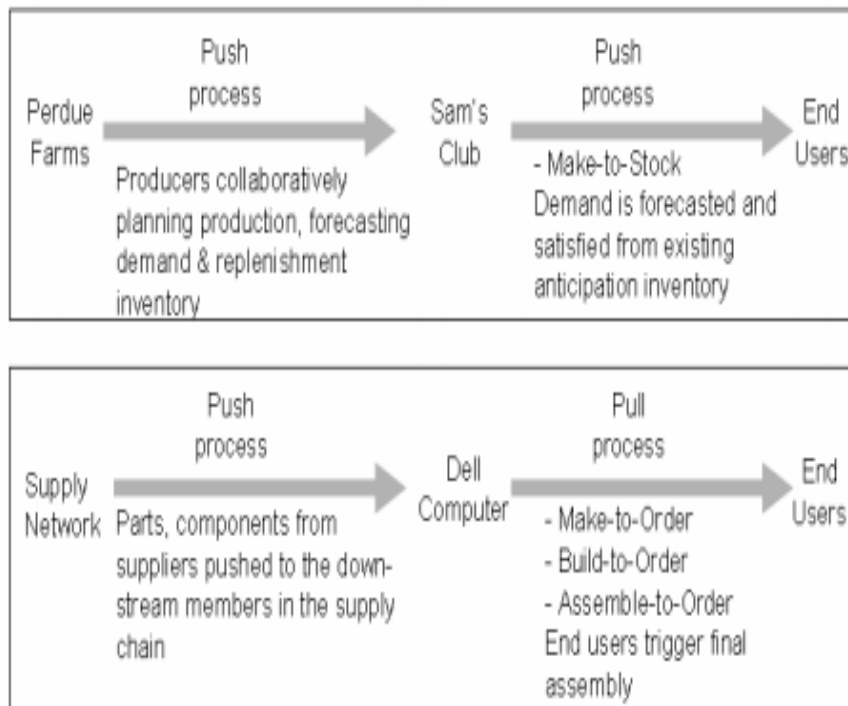
The purpose of an efficient supply chain is to coordinate the material flow and services to minimize inventories and maximize the efficiency of the manufacturers and service providers in the chain. This supply chain model best fits the environment in which demands are highly predictable, forecasting error is low, product life cycle is long, new product introductions are infrequent, product variety is minimal, production lead-time is long and order fulfillment lead-time is short. The efficient supply chain design matches competitive priority emphasizing on low cost operations and on-time deliver.

## Efficient supply chain and responsive supply chain

	Efficient supply chain	Responsive supply chain
Demand	Constant, based on forecasting	Fluctuate, based on customer orders
Product life cycle	Long	Short
Product variety	Low	High
Contribution margin	Low	High
Order fulfill lead time	Allowed longer fulfillment lead time	Short or based on quoted due date
Supplier	Long-term	According to product life cycle
Production	Make-to-stock	Assemble-to-order Make-to-order Build-to-order
Capacity cushion	Low	High
Inventory	Finished goods inventory	Parts, components, subassembly
Supply selection	Low cost, consistent quality, and on-time delivery	Flexibility, fast-delivery, high-performance design quality

Demand is forecasted based on historical sales data. The need from the end users is satisfied from inventory. Production lead-time is relatively long and finished goods inventory is more than that of the pull system. The major technical sophistication that has been applied in the supply chain is Perdue Farms' vertical integration, which focuses on "We do it all for you." In the pull approach, end users trigger the production of computers at Dell's manufacturing factory. The major production strategy is make-to-order, assemble-to-order, and build-to-order. In a pull scenario, demand uncertainty is higher and cycle time is shorter than that of the push approach. Finished goods inventory is minimal. Dell is an obvious captain of the supply chain. The major technical sophistication that has been applied in the supply chain is Dell's direct model, which focuses on "Have it your way."

## Pull vs Push Process



The distributor's orders placed to the factory fluctuated much more than retail sales. In addition, P&G's orders to its suppliers fluctuated even more. This phenomenon of increasing variability in demand in a supply chain is referred to as the bullwhip effect. The bullwhip effect is essentially the artificial distortion of consumer demand figures as they are transmitted back to the suppliers from the retailer. One way to address the bullwhip effect caused by order batching is to collaboratively plan production, forecast demand, and replenish inventory. This will lead to smaller order sizes, smoothed production volumes, and more frequent order replenishment. The result will be a smoother flow of smaller orders that the distributors and manufacturers are able to handle more efficiently. In recently years, retailers have initiated collaborative agreements with their supply chain partners to establish on going planning, forecasting, and replenishment process. This initiative is called collaborative planning, forecasting, and replenishment issues (CPFR). The Association for Operations Management defines CPFR as follows: "Collaboration process whereby supply chain trading partners can jointly plan key supply chain activities from production and delivery of raw materials to production and delivery

of final products to end customers” - The Association for Operations Management” - The Association for Operations Management.

The objective of CPFR is to optimize supply chain through improved demand forecasts, with the right product delivered at right time to the right location, with reduced inventories, avoidance of stock-outs, and improved customer service. The value of CPFR lies in the broad exchange of forecasting information to improve forecasting accuracy when both the buyer and seller collaborate through joint knowledge of sales, promotions, and relevant supply and demand information.

Companies that are able to establish collaborative supply chains will have a significant competitive edge over their competitors. Prominent companies are already beginning to lead the way. Companies such as Wal-Mart, Dell Inc., and Proctor & Gamble share point of sales data with all the other companies in their respective supply chains. The companies in these supply chains are also starting to share inventory data with each other. Sharing this kind of information provides a basis for each company to make decisions about its own activities that will yield better efficiencies and more profits for itself and for the supply chain as a whole. Collaboration in production, forecasting, and replenishment brings a number of benefits. First, the bullwhip effect is diminished because all companies in the supply chain have access to real time sales data and share sales forecasts. This allows every member in the same supply chain to develop a better production plan, ideal inventory levels, and realistic delivery schedules. Next, everyone in the supply chain shares rise and decline in customer demand. Adjustment to the previously planned production levels is made accordingly.

Secondly, transportation infrastructure varies from country to country across Europe. The geography of a country affects accessibility, which in turn influences both transportation methods as well as distribution networks. For example, Italy chooses a more local distribution network due to its compartmentalized geography. Holland, on the other hand, tends to use a more centralized distribution network with its relatively accessible geography. These transportation and distribution issues have led some firms to establish regional stockholding distribution centers, which may reduce the need and

reliance on extensive distribution networks and reduce the dependency on transportation. A considerable disadvantage of localized transportation systems in Europe is its relatively low usage of rail to transport freight. Poorly maintained infrastructure in some Eastern European countries, as well as differences in rail gauge size, technical standards, and height/width allowances between countries within Europe are the issues that slow down the development of supply chain management. Finally, the application of current technology also varies from country to country. Unlike the U.S., the availability of reliable Internet access and current technologies is not always a given in all countries throughout Europe. The variation of Internet access from region to region has a significant impact on the ability of firms to conduct collaborative planning, forecasting and replenishment within the supply chain in order to compete on a global level. Although the continent and its countries are fighting to overcome some inherent challenges, Europe has made some significant strides forward and has implemented innovations to overcome some of these challenges. Mobile commerce (m-commerce), vehicle tracking and dispatching, radio frequency identification (RFID) tags, silent commerce applications, and collaboration are few examples of recent development in Europe. High cell phone usage level has led to the development of mobile networks that are integrated into back end operation.

Supply chain management in Asia is considered more fragmented and less competitive than those in the United States and Europe, but the gap between these regions is closing. First, the Asian market is made up of many countries varying in culture, religion, political system, language, legal system, and stages of economic development. Some of the major countries include Japan, China, India, Australia, Indonesia, South Korea, and Thailand. This list of countries presents an obvious diversity in various aspects. Culturally speaking, most Asian cultures differ greatly from Europe and the United States. As an example, Asian culture values relationships greatly, and they are established over time and past dealings. This precludes the establishment of quick business deals. The focus tends to be on the establishment of respectful relationships over time. Second, the transportation infrastructure in many developing countries in Asia is less developed as compared to that of the US and Europe. Traditionally, rail transportation was a dominant public transportation in countries such as India, China, and Japan. Air transportation is

undergoing fast development in recent years, and highway construction is advancing at a rapid pace. For example, China is aggressively developing its highway system as well as improving the efficiency of its rail freight industry. In 2000, 50,000 kilometers of new highway was added in China. Finally, technology is also a major concern to developing efficient supply chains in Asia. There is weak availability of information technology in many developing Asian countries. Lowering production costs has been prevalent in Asia.



## **OBJECTIVE AND SCOPE OF THE RESEARCH**

- To study Supply chain management concepts and practices in industrial scenarios.
- To carry out supply chain opportunity analysis with particular reference to Delhivery
- To benchmark the implementation of Supply chain management techniques in Delhivery

## **RESEARCH METHODOLOGY**

Researcher will use the both primary and secondary data to fulfill the research objectives. Interviews will be conducted to gather the primary data. Secondary data will be collected through online references, magazines and news papers

The data will be collected through primary and secondary sources.

**Primary Data:** Information is gathered by the researcher himself. Primary data will be collected through questionnaires and informal interviews.

**Secondary Data:** Secondary data will be collected through internet, Published articles in the newspapers, magazines, journals and Books.

**Sampling Method:** Convenient sampling method would be used for the proposed research.

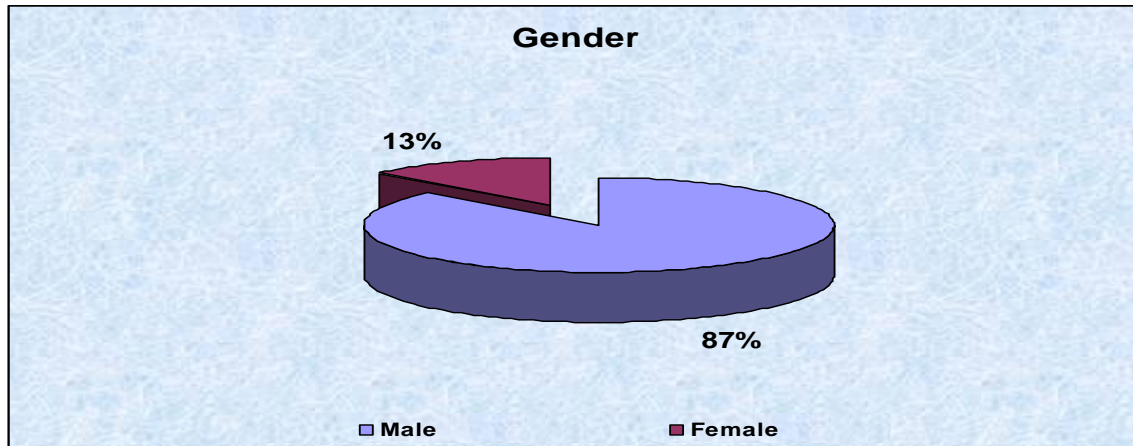
**Sample Size:** 60

**Area of Study:** Delhivery, Gurugram

**Target Audience:** Employees of Delhivery, Gurugram

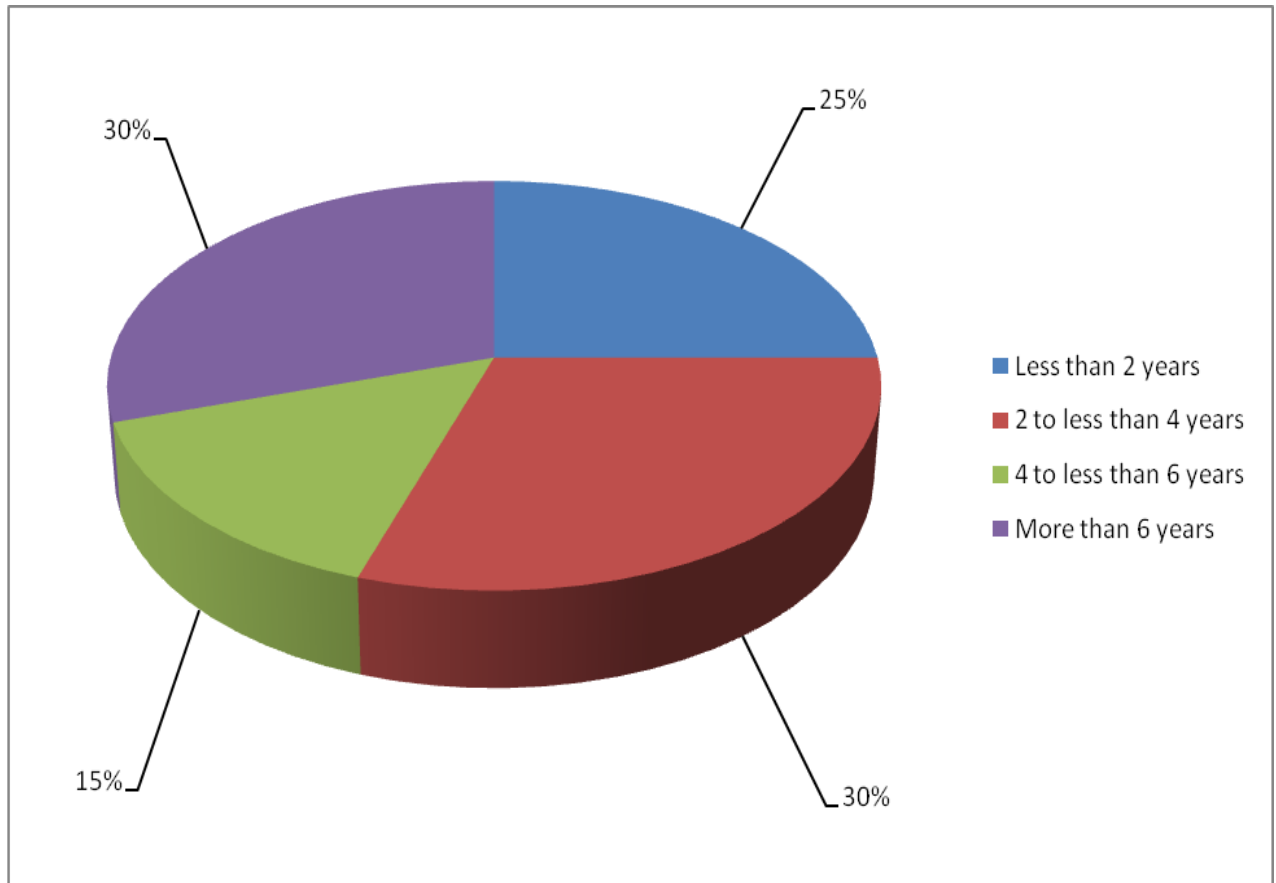
## DATA PRESENTATION AND INTEGRATION

Q1. Gender



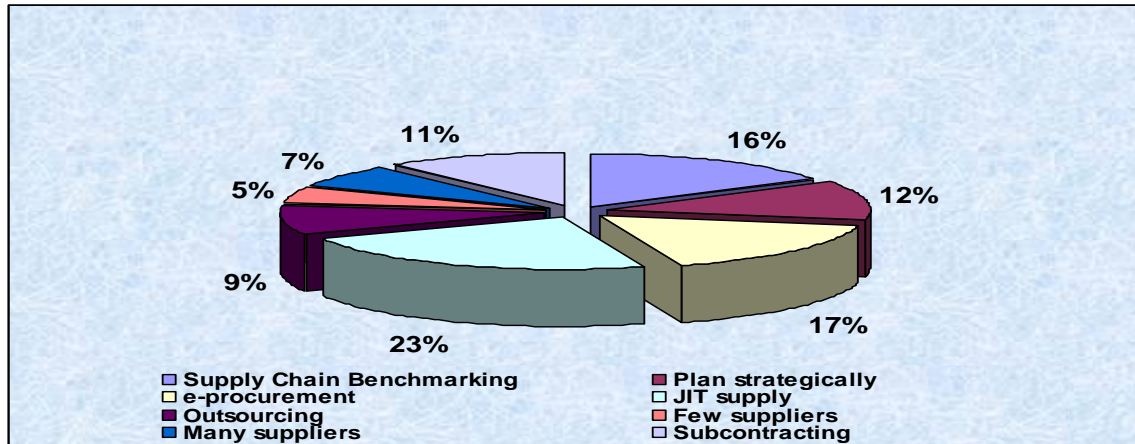
The above figure shows the split of sample between the genders of the respondents as 87% of the respondents were male and rest of them was females.

Q2. From how many years you have been working in the organization?



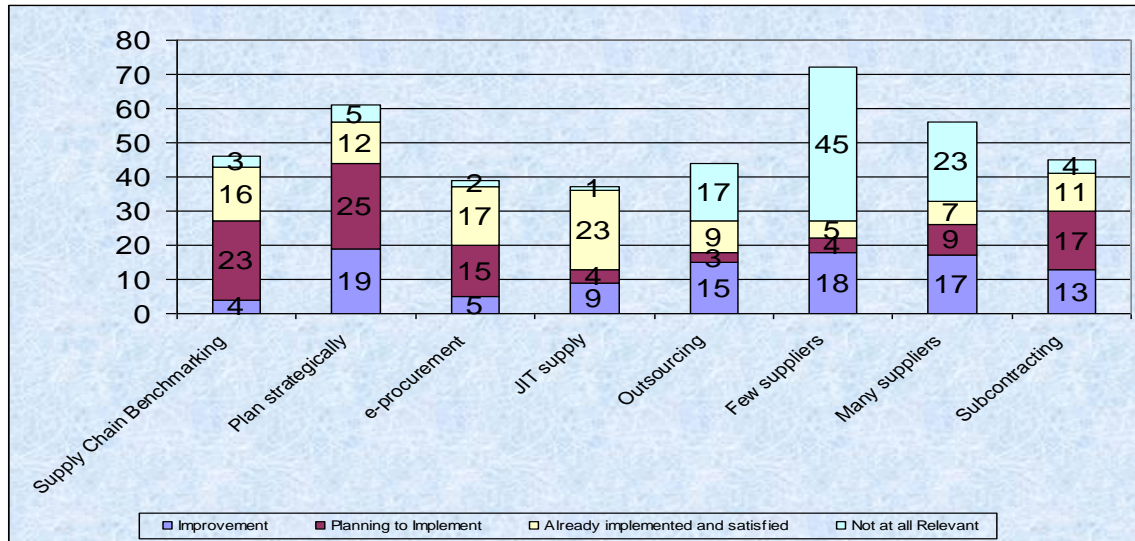
30% respondents replied that they have been working in this organization from 2 to less than 4 years but 15% respondents replied that they have been working in the organization from 4 to less than 6 years.

Q3. Which of the following methods/application you used to manage the export logistics?  
(Select all that apply)



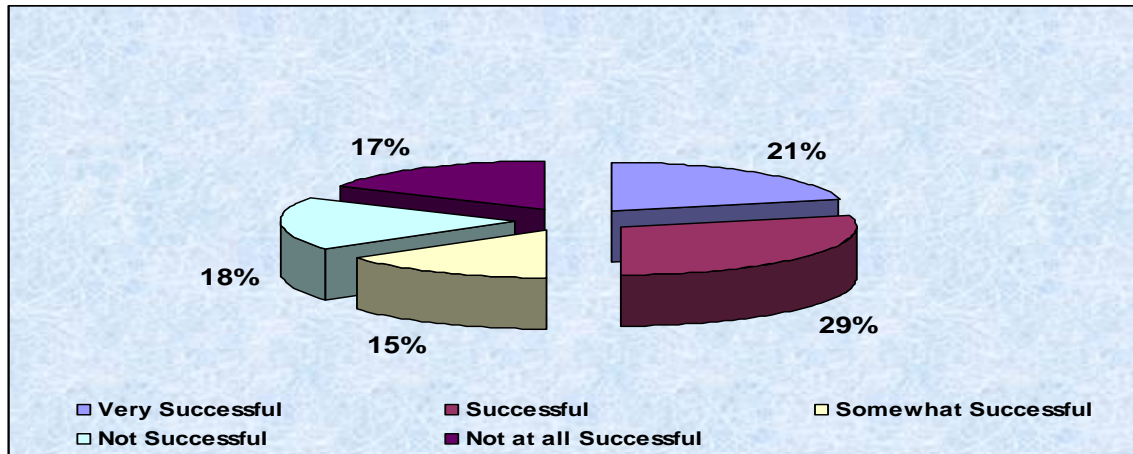
The above figure represents the systems and application used by the companies for managing their supply chain. 23% of the respondents replied that they use Just in Time approach and 17% said that e-procurement is the most prominent system used in their company for effectively managing the supply chain. Both these systems are very old in the field of supply chain and provide the greater benefits without incurring any additional cost to the companies.

Q4. For each of the above mentioned method/application, what do you think your company requires for managing the export logistics effectively?



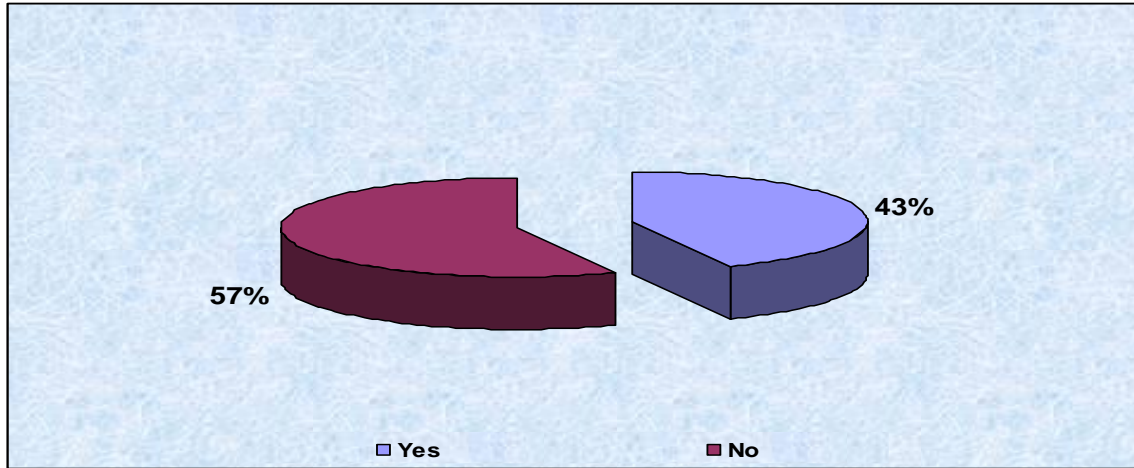
The above figure indicates the requirement of the companies for managing their supply chain. Supply chain benchmarking and plan strategically are the areas where the companies are seeking the improvement for managing their supply chain effectively.

Q5. Do you think your company is successful in managing the supply chain? Please rate your opinion on the scale of 1 to 5 where 1 means not at all successful and 5 means very successful.



The above figure provides the agreement of the companies towards the success or failure after implementing the various systems/applications for managing the supply chain. 29% of the respondents replied that the companies are successful with their current systems since every application or system developed for supply chain gives separate and sure benefits to the company however it depends on the nature of the business.

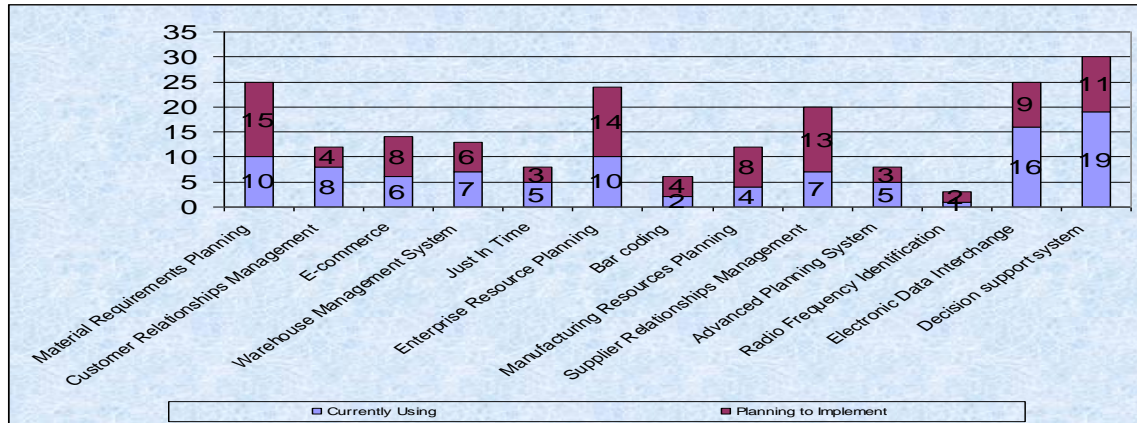
Q6. Please tell me whether your company has a separate strategic plan for managing the logistics?



It is essential for the companies to develop strategic plan for managing any of the business process. in this context above figure shows that 57% of the companies have strategic plan and remaining companies do not have such plans since they are not sure whether their supply chain is effectively managed or not.

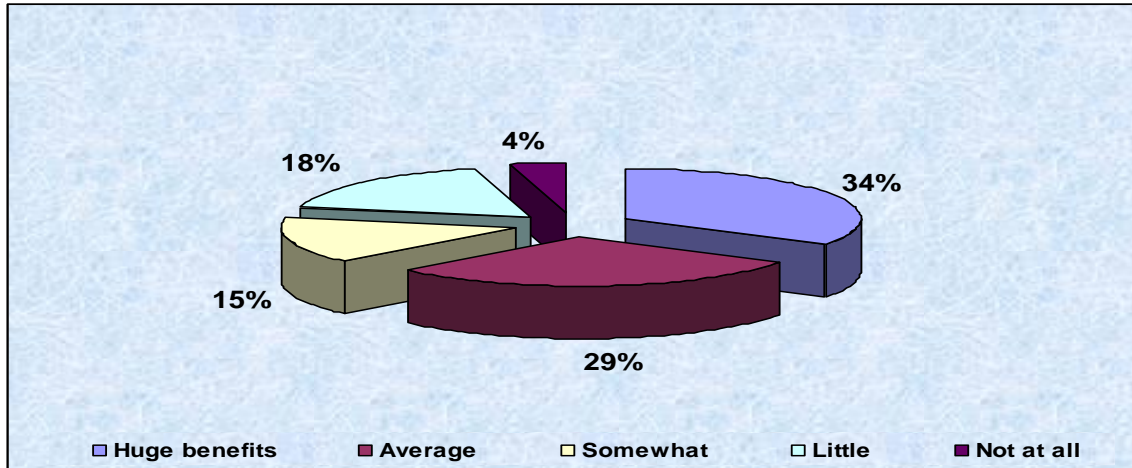


Q7. Please tell me which of the following systems are used within your organization for managing the supply chain or planning to implement in next six months?



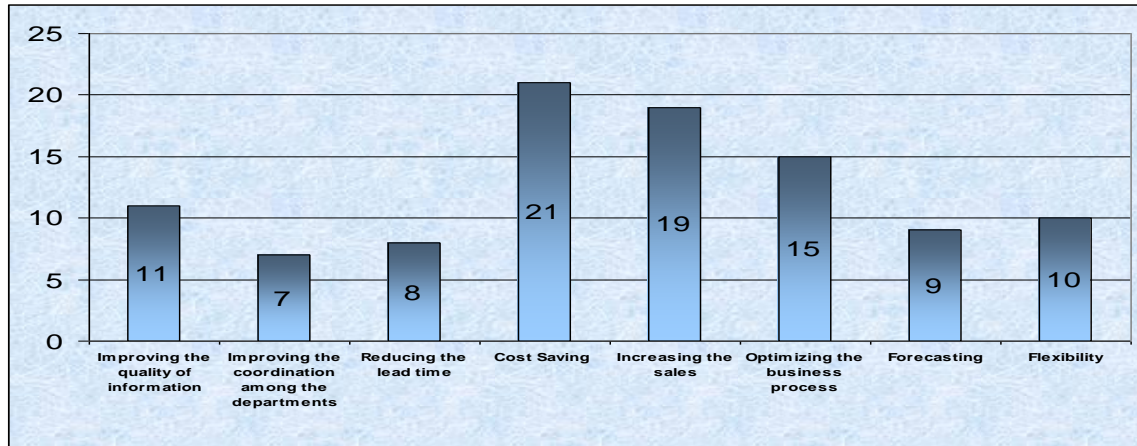
The above figure shows the applications which have been implemented or being considered by the companies for managing the supply chain. Enterprise resource planning, decision support system and electronic data interchange are the most desired applications which are currently used by the companies and also the remaining companies are considering implementing them. All the three applications are new to the system and include greater benefits for effectively manage the supply chain process within the organization.

Q8. How much do you think the above system(s) is effective in managing the supply chain within your has the benefits?



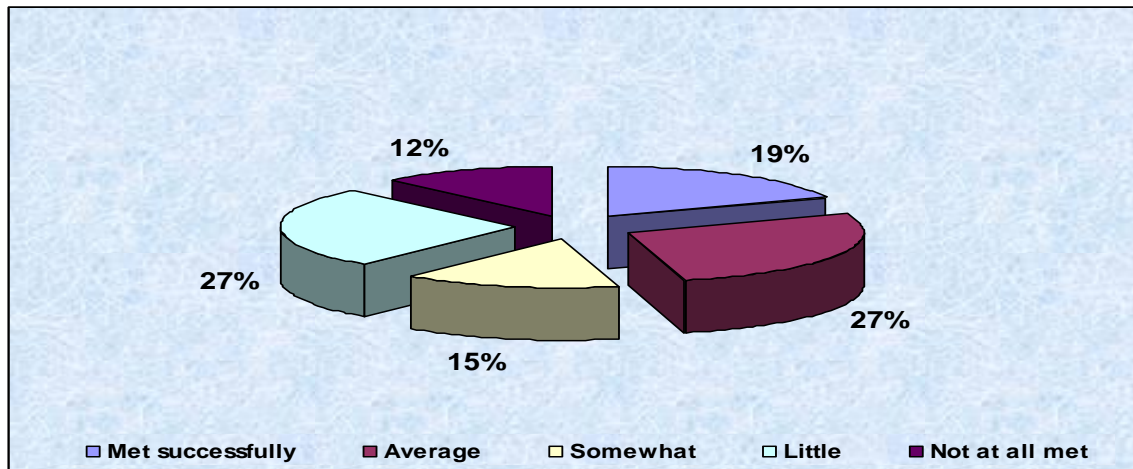
The above figure provides the consent of the companies for having benefits by implementing the above mentioned systems in the supply chain process. 29% of the respondents replied that their companies are having average benefit however 34% said that their companies are having huge benefits by implementing such system in place.

Q9. What are the primary goals for managing the supply chain? Please select from the following.



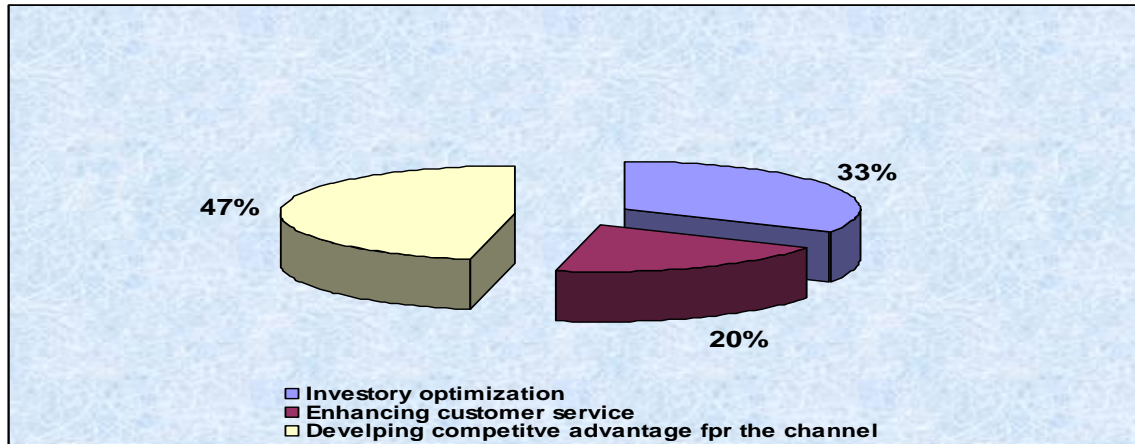
The above figure shows the primary goals of the companies for managing their supply chain. Cost saving is the most desired goal for the companies looking at the current economic crisis and credit crunch. Increasing sales, improvement in the quality of information, optimizing the business process and forecasting are the second preferences of the companies to manage their supply chain.

Q10. Have you met the desired goals by currently using or implementing the above systems selected in q 5?



The above figure shows the consensus of the companies for meeting the desired goals by implementing the various systems and applications in their supply chain. There are more than 39% of the companies that have met their desired goals however those which are still seeking the success require the consultant expertise for fully implement such systems in place in efficient management of supply chain process.

Q11. Please tell me what do you think will be the major reason for developing the supply chain management within your organization?



The above figure shows the reason for developing the supply chain management within the company. 47% of the companies want to gain the competitive advantage and second preference is to optimize the inventory level which leads the greater cost saving advantage to the companies.

## **CONCLUSION & SUGGESTIONS**

### **CONCLUSION**

Organizations have multiple objectives like enhanced competitiveness, better customer service and increased profitability etc. To seek these objectives organizations employ various defensive as well as offensive business performance improvement approaches. Often these approaches focus on any one operational area of organization. But the approach we have discussed (SCM) covers all functional areas of organization. It is the network of customers, suppliers, manufacturers, and distributors concentrating the flows of material, information, and finance through physical and human resources. Due to globalization organizations cannot work as standalone units. There is a continuous need to interact with supply chain partners to achieve the basic objective of organization.

SCM requires concerted action of all the participants therefore adoption and implementation cannot be as straightforward as other approaches. Researchers and practitioners have developed a sustainable body of knowledge by deploying various qualitative and quantitative tools and techniques. It is observed that organizations have unique products, operations, culture; and have a different level of compatibility & adaptability. Therefore there cannot be one fix solution for all organizations. Depending upon corporate strategy organizations will have to develop a suitable supply chain management strategy .It would be a formidable task for managers if they do not understand the theoretical foundations and practical implications of SCM. In this paper it has suggested that managers must probe why to manage, what to manage and how to manage the supply chain. We discussed the concept of supply chain management along with the need of SCM from organization point of view. This provides deeper insights for those managers investigating the concept of supply chain management.

In order to explore the domain of supply chain management we have argued that one must examine the nature, interrelations and dependency among business operations .We interrogated the theory and research practice to find what are the various supply chain activities. This through analysis of activities sheds light on the potential of supply chain

management. Next big challenge for organizations is to make a suitable roadmap for adoption and implementation .We have suggested a six-step approach to meet this challenge. This step-by-step assessment of business operations would certainly assist organizations to completely understand the concept of supply chain management. Sooner or later all organizations would adopt SCM; therefore we recommend that managers should examine the domain of SCM to achieve business excellence. Current trends like outsourcing, information technology adoption and third party logistics presents an opportunity for development of SCM. It is felt that in future all organizations will have to adopt partnership information sharing initiative with suppliers. Therefore establishment of mutual trust within supply chain to share the vital information for effective SCM practice; and development of suitable mathematical model for the same would be the greatest challenge for researchers and practitioners.

## **SUGGESTIONS**

SCM is management of material, money, men, and information within and across the supply chain to maximize customer satisfaction and to get an edge over competitors. Customers want products at the right place and at the right time. For this, there should be an excellent synchronization between the manufacturer and the customers. This was the origin of the “Barter system” as we all know. As things started becoming complicated, where one person had to reach many individuals for his needs, one of the individuals started management of gathering the products from different people and supplying to those who are in need and thus fulfilling his needs in return. This was the revolutionized form of the Barter system and today it is known as the supply chain management. Researchers found that the lack of commonly accepted definition of supply chain management and the problems associated with supply chain activities makes the understanding of supply chain management difficult.

Supply chain management is an enormous topic covering multiple disciplines deploying many quantitative and qualitative tools. There are numerous definitions of SCM; effectively integrating the information and material flows within the demand and supply process is what Supply Chain Management is all about. In most companies, however, two

major and very interdependent issues must be simultaneously addressed. The first deals with delivering products with customer-acceptable quality, with very short lead times, at a customer-acceptable cost - while keeping inventories throughout the supply chain at a minimum. The second issue, which tends to be less understood and accepted, is the need for high quality, relevant and timely information that is provided when it needs to be known. For many customers and manufacturers, business processes and support systems will not measure up to the task of quickly providing planning and execution information from the marketplace to production and onto vendors so that the customer's objectives are consistently met. Fast access to relevant supply chain information can pay-off handsomely in lower costs, less inventory, higher quality decision-making, shorter cycle times and better customer service.

One of the biggest cost savings is in the overhead activity associated with lots of paperwork and its inherent redundancies. The non-value added time of manual transaction processing can instead be focused on higher revenue creation activities without proportional increases in expense. The result in cycle time compression, lower inventories, decision-making quality, reduced overhead costs, among other benefits makes Supply Chain Management a highly desirable strategy. Supply chain processes can be more streamlined and efficient than could have been imagined just a few years ago. For many companies, more effective Supply Chain Management is where the profit and competitive advantages will emerge and be sustained.



## **BIBLIOGRPAHY**

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- Larson, P. and Halldorsson, A. (2007) “Logistics versus supply chain management: an international survey. International”, *Journal of Logistics: Research & Application*, Vol. 7(1), pp. 17-31.
- The Times of India
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- <http://www.delhivery.com>

## QUESTIONNAIRE

Q1. Gender

Male

Female

Q2. From how many years you have been working in the organization?

Less than 2 Years

2 to less than 4 years

4 to less than 6 years

More than 6 years

Q3. Which of the following methods/application you used to manage the export logistics?

(Select all that apply)

Supply Chain Benchmarking	<input type="radio"/>
Plan strategically	<input type="radio"/>
e-procurement	<input type="radio"/>
JIT supply	<input type="radio"/>
Outsourcing	<input type="radio"/>
Few suppliers	<input type="radio"/>
Many suppliers	<input type="radio"/>
Subcontracting	<input type="radio"/>
Other, please specify	<input type="radio"/>

Q4. For each of the above mentioned method/application, what do you think your company requires for managing the export logistics effectively?

	Improvement	Planning to Implement	Already implemented and satisfied	Not at all Relevant
Supply Chain Benchmarking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plan strategically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e-procurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
JIT supply	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Outsourcing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Few suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Many suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Subcontracting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, please specify	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5. Do you think your company is successful in managing the supply chain? Please rate your opinion on the scale of 1 to 5 where 1 means not at all successful and 5 means very successful.

Very Successful	<input type="radio"/> 5
Successful	<input type="radio"/> 4
Somewhat Successful	<input type="radio"/> 3
Not Successful	<input type="radio"/> 2
Not at all Successful	<input type="radio"/> 1

Q6. Please tell me whether your company has a separate strategic plan for managing the logistics?

Yes

No

Q7. Please tell me which of the following systems are used within your organization for managing the supply chain or planning to implement in next six months?

	Currently Using	Planning to Implement
Material Requirements Planning	<input type="radio"/>	<input type="radio"/>
Customer Relationships Management	<input type="radio"/>	<input type="radio"/>
E-commerce	<input type="radio"/>	<input type="radio"/>
Warehouse Management System	<input type="radio"/>	<input type="radio"/>
Just In Time	<input type="radio"/>	<input type="radio"/>
Enterprise Resource Planning	<input type="radio"/>	<input type="radio"/>
Bar coding	<input type="radio"/>	<input type="radio"/>
Manufacturing Resources Planning	<input type="radio"/>	<input type="radio"/>
Supplier Relationships Management	<input type="radio"/>	<input type="radio"/>
Advanced Planning System	<input type="radio"/>	<input type="radio"/>
Radio Frequency Identification	<input type="radio"/>	<input type="radio"/>
Electronic Data Interchange	<input type="radio"/>	<input type="radio"/>
Decision support system	<input type="radio"/>	<input type="radio"/>
Other, please specify	<input type="radio"/>	<input type="radio"/>

Q8. How much do you think the above system(s) is effective in managing the supply chain within your has the benefits?

Huge benefits	<input type="radio"/>
Average	<input type="radio"/>
Somewhat	<input type="radio"/>
Little	<input type="radio"/>
Not at all	<input type="radio"/>

Q9. What are the primary goals for managing the supply chain? Please select from the following.

Improving the quality of information	<input type="radio"/>
Improving the coordination among the departments	<input type="radio"/>
Reducing the lead time	<input type="radio"/>
Cost Saving	<input type="radio"/>
Increasing the sales	<input type="radio"/>
Optimizing the business process	<input type="radio"/>
Forecasting	<input type="radio"/>
Flexibility	<input type="radio"/>
Others, please specify	<input type="radio"/>

Q10. Have you met the desired goals by currently using or implementing the above systems selected in q 5?

Met successfully	<input type="radio"/>
Average	<input type="radio"/>
Somewhat	<input type="radio"/>
Little	<input type="radio"/>
Not at all met	<input type="radio"/>

Q11. Please tell me what do you think will be the major reason for developing the supply chain management within your organization?

Inventory optimization	<input type="radio"/>
Enhancing customer service	<input type="radio"/>
Developing competitive advantage for the channel	<input type="radio"/>
Others, Please specify	<input type="radio"/>

## SYNOPSIS

<b>*Title of the project:</b>	<b>A Study of Supply Chain Management with reference to Delhivery</b>
<b>Project Area</b>	Operation
<b>Abstract :</b>	<p>The management of such a network requires mastery of optimization logistics, or the specific quantity of a good needed at a particular time and price. Clearly, relationships with suppliers that make up these networks are a central component of successful supply chain management. Increasingly, business school faculty is beginning to recognize the environmental and social issues that add complexity to the supplier-buyer relationship, and hence expand its textbook definition. Buyers, facing public relations pressures in their home countries and looking for opportunities for a competitive advantage, are concerning themselves with supplier employee working conditions and human rights as well as environmental issues, like limiting emissions and packaging waste. But some argue that price and timing pressures from buyers may have contributed to negative conditions at supplier facilities in the first place. Given these dynamics, future business leaders entering the supply chain arena require thorough understanding of methods and metrics of how to accurately assess these relationships.</p>
<b>Why is the particular topic chosen :</b>	<p>Today's business climate has rapidly changed and has become more competitive as ever in nature. Businesses now not only need to operate at a lower cost to compete, it must also develop its own core competencies to distinguish itself from competitors and stand out in the market. In creating the competitive edge, companies need to divert its resources to focus on what they do best and outsource the process and task that is not important to the overall objective of the company.</p>
<b>Objective:</b>	<ul style="list-style-type: none"> <li>• To study Supply chain management concepts and practices in industrial scenarios.</li> <li>• To carry out supply chain opportunity analysis with particular reference to Delhivery</li> <li>• To benchmark the implementation of Supply chain management</li> </ul>

	techniques in Delhivery
<b>Scope:</b>	Organizations have multiple objectives like enhanced competitiveness, better customer service and increased profitability etc. To seek these objectives organizations employ various defensive as well as offensive business performance improvement approaches. Often these approaches focus on any one operational area of organization. But the approach we have discussed (SCM) covers all functional areas of organization.
<b>What contribution would the project make and to whom?:</b>	Supply chain management (SCM) is the term used to describe the management of the flow of materials, information, and funds across the entire supply chain, from suppliers to component producers to final assemblers to distribution (warehouses and retailers), and ultimately to the consumer.
<b>Name of the organization</b>	Delhivery
<b>Methodology:</b>	<p><b>Primary Data:</b> Primary data for this project work was collected through questionnaire survey.</p> <p><b>Secondary Data:</b> The secondary data in this research was collected through news articles, journals, magazine, peer reviews and published databases.</p>
<b>Chapter scheme</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Company Profile</li> <li>3. Objective &amp; Scope of the Study</li> <li>4. Research Methodologies</li> <li>5. Literature Review</li> <li>6. Data Analysis</li> <li>7. Conclusions and Suggestions</li> <li>8. Bibliography</li> </ol>

	9. Annexure
<b>References</b>	<ol style="list-style-type: none"> <li>1. Yuniya Kawamura: <i>Fashion-ology. An introduction to Fashion Studies</i>, Oxford and New York: Berg, 2015, ISBN 1-85973-814-1</li> <li>2. Gould, J and Dansk, G (2016). Children's Preferences for Product Attributes of fashion Pre-Sweetened Cereals. <i>Journal of food Products Marketing</i>, 3(2):19-38.</li> </ol>
<b>*Name and designation of project guide:</b>	Princy Arora, Deputy Manager
<b>Qualification and Years and Experience</b>	MBA, 31 Years, 9 Years