CHAPTER 1

INTRODUCTION TO SUPPLY CHAIN MANAGEMENT (SCM)

INTRODUCTION

A supply chain is a network of supplier, manufacturer, assembly, distribution and logistics facilities that perform the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these products to customers. Supply chains arise in both manufacturing and service organizations.

A supply chain is a collection of interdependent steps that, when followed, accomplish a certain objective such as, meeting customer requirements. The supply chain is gaining prominence as manufacturer control less of the speed at which products are manufactured and distributed. The main reasons for decreasing manufacturing control are the parity across the board in product quality and price wars with the emergence of global competition.

The Supply Chain (SC) encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows. Materials and information flow both up and down the supply chain.

DEFINITIONS OF SUPPLY CHAIN MANAGEMENT (SCM)

According to Ganeshan and Harrison, "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."

According to Jones and Riley, "Supply chain management deals with the total flow of material from supplier through end user."

According to Cooper and Ellram, "Supply chain management is an integrative philosophy to manage the total flow of distribution channel from the supplier to the ultimate user."

According to Marty Weil, "Supply chain management is the ability to g closer to the customer."

According to Professor Douglas M. Lambert, "Supply chain management aj the integration of business process from the end user through original suppliers who provide products, services, and information that adds value for the customer."

According to Handheld and Nichols, "Supply chain management is the integration and management of supply chain organizations and activities through co-operative organizational relationships, effective business processes and high levels of information sharing to create high-performing value system that provide member organizations a sustainable competitive advantage."

According to Christopher, "SCM is the management of upstream an downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole."

CONCEPT OF SCM

Supply Chain Management is the systematic, strategic co-ordination of the traditional business functions and the tactics across these business functions within a particular company and across business within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.

Supply chain management is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers. SCM deals with design, planning, execution, control, and monitoring of supply chain activities with the objective of creating the value

Supply chain management is a systems approach to managing the entire flow u information, materials, and services from raw materials suppliers through management, which emphasizes only the buyer-supplier relationship.

Supply chain management has emerged as the new key to productivity competitiveness of manufacturing and service enterprises. The importance of this area is shown by a significant spurt in research in the last five years also proliferation of supply chain solutions and supply chain companies.

FEATURES OF SCM

Supply chain management has following features:

1. Integrated Behavior

SCM incorporates integration of stakeholders from suppliers to customers

2. Mutually Sharing Information

For effective SCM mutually sharing information among channel members is required, especially for planning and monitoring processes.

3. Mutually Sharing Channel Risks and Rewards

Effective SCM alto requires mutually sharing channel risks and rewards that yield competitive advantage. Risk and reward sharing should happen over the long-term. Risk and reward sharing is important for long-term focus and cooperation among the supply chain members.

4. Co-operation

Co-operation among the channel members is required for effective SCM. Co-operation refers to similar or complementary coordinated activities performed by firms in a business relationship to produce superior mutual outcomes or singular outcomes that are mutually expected over time. According to Cooper and Ellram, co-operation is not limited to the needs of the current transaction and happens at several management levels (for example, both top and operational managers), involving cross-functional coordination across the channel members.

5. Focus on Serving Customers

Supply chain succeeds if all the members of the supply chain have the Same goal and the same focus of serving customers. Establishing the same goal and the same focus among supply chain members is a form of policy integration.

6. Integration of Processes

The implementation of SCM needs the integration of processes from sourcing, to manufacturing and to distribution across the supply chain. The integration can be accomplished through cross-functional teams, in-plant supplier personnel and third-party service providers.

7. Partners to Build and Maintain Long-term Relationships

Successful relationships aim to integrate channel policy to avoid redundancy and overlap while seeking a level of co-operation that allows participants to be more effective at lower cost levels. Policy integration is possible. if there are compatible cultures and management techniques among the chain members.

OBJECTIVES OF SCM

The objectives of supply chain management are as follows:

1. Service Orientation (i.e., Service to the Customer)

The very basis of supply chains has been to provide superior customer service. Service is all about the value that the customer gets, which in turn depends upon his own perception about what constitutes value.

2. Systems Orientation

Systems orientation is at the core of the existence of any supply chain. Synergy due to cooperation and coordination is the main gain of a supply chain. This entails that while getting optimal results for the chain as a whole, the results for the partners on the chain may not necessarily be optimal; these could be less than optimal. But, there are substantial gains for all the partners in working together.

3. Competitiveness and Efficiency

The supply chain is a business organization. It provides value to the customer while being competitive. Competitiveness is essential for it to healthily sustain itself in order to be able to provide increasing value to its customer. Efficiency is an important element of competitiveness.

4. Minimizing the Time

Efficient supply chain in an organization reduces the time required for converting orders into cash. So there is minimal time lag and increase in productivity of the organization.

5. Minimizing Work-in-progress

Supply chain minimizes total work in process in supply chain.

6. Improving Pipeline Visibility

Efficient supply chain improves the visibility of each one of the activities of the supply chain by each one of the partners.

7. Improving Visibility of Demand

Efficient supply chain improves visibility of demand by each one of the partners.

8. Improving Quality

Efficient supply chain helps in improving the quality of operations of the organizations.

9. Reduces Transportation Cost

Efficient supply chain reduces the transportation cost, thus helps in increasing efficiency and reduction in carrying cost for the company.

10. Reduces Warehousing Cost

Efficient supply chain helps in reduction of; warehousing cost for the company as there will be less held up of inventory.

11. Rationalize Supplier Base

Organizations that procure commodities or multiple services often find themselves with a range of suppliers. organizations grow the number of suppliers may increase, large companies may have a supplier base of tens of thousands of suppliers and this tail can become increasingly complex to manage coupled with a relatively poor return from fragmented use of spending power.

12. Expanding Width/Depth of Distribution

Efficient supply chain helps in expansion of width and depth of distribution.

13. Life-Cycle Support

An important objective is life-cycle support. Few items are sold without some guarantee that the product will perform as advertised over a specified period. In some situations, the normal value- added inventory flow toward customers must be reversed. Product recall is a critical competency resulting from increasingly rigid quality standards, product expiration dating and responsibility for hazardous consequences.

14. Improving Value

The objective of every supply chain is to maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer and the effort the supply chain expends in filling the customer's request.

ROLE OF SCM

Supply chain roles can be grouped into strategic, tactical, and operational levels of activities:

1. Strategic Role

a) Strategic network optimization, including the number, location, and size of warehouses, distribution centers and facilities.
b) Strategic partnership with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics.
c) Product designs co-ordination, so that new and existing products can be optimally integrated into the supply chain, load management.
d) Information Technology infrastructure, to support supply chain operations.
e) Where-to-make and what-to-make-or-buy decisions.
f) Aligning overall organizational strategy with supply strategy.

2. Tactical Role

a) Sourcing contracts and other purchasing decisions.
b) Production decisions, including contracting, scheduling, and planning process definition.
c) Inventory decisions, including quantity, location, and quality of inventory.
d) Transportation strategy, including frequency, routes, and contracting.
e) Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
f) Milestone payments.
g) Focus on customer demand.

3. Operational Role

a) Daily production and distribution planning, including all nodes in the supply chain.
b) Production scheduling for each manufacturing facility in the supply chain (minute by minute).
c) Demand planning and forecasting, co-coordinating the demand force of all customers and sharing the forecast with all suppliers.
d) Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
e) Inbound operations, including transportation from suppliers and receiving inventory.
f) Production operations, including the consumption of materials an flow of finished goods.
g) Outbound operations, including all fulfillment activities an transportation to customers.
h) Order promising, accounting for all constraints in the supply chain including all suppliers, manufacturing facilities, distribution centre and other customers.

TYPES OF SUPPLY CHAIN

Different types of supply chains are as follows:

1. Raw Supply Chains

This is the basic type that were loosely organized and mostly conformed to the legacy style. The departmental silos are still there but there is better co-ordination between them. This gave them better visibility into the company's operations than before. This is called a supply chain as there is some improvement over the processes followed otherwise. These so-called supply chains are found in ancillary units and small scale industries.

2. Ripe Supply Chains

It is the ones where companies thought this was it and they have achieved all that there is to achieve. All the activities are done in an organized manner, companies have improved relationships with their suppliers and distributors and there was some amount of information flowing in through the chain. However, there are no other supply chain initiatives in the pipeline. These chains exist in the food sector.

3. Internal Supply Chains

These are the most commonly found where the companies have implemented sophisticated enterprise resource planning packages and their internal operations are absolutely

fine, tuned and well coordinated. However, they have not brought their suppliers or distributors into their fold. These companies are completely besotted by achieving internal optimization. The companies in this category are from all sectors and include all types of companies.

4. Extended Supply Chains

Extended supply chains are the internally optimized chains that extend well beyond the company's boundaries to include the suppliers and distributors into their fold. These companies, however, concentrate only on the top suppliers and the top distributors. In that sense there is a partial integration. Websites and specific web pages are used to communicate with external partners. However, complete integration wherein one Enterprise Resource Planning talks to the other and exchanges information smoothly without human intervention is missing. Once again this is a very commonly found supply chain spanning all sectors but specifically common in the automotive sector.

5. Self-monitored Supply Chains

It is the ones where the manufacturing company takes the lead in bringing all-partners in its fold and hence these supply chains are company centric and not customer centric. Although they are able to achieve a considerable speed to market, it is not because of total optimization.

6. Outsourced Supply Chains

Outsourced supply chains are where the logistics partner (3 PL) usually takes care of everything outbound logistics, inbound logistics, relationships, information flow, etc. They make r decisions and they monitor the supply chain. This is very rare and is found to exist in some of the export houses. As there are only activities such as procuring and exporting (no production) this is the most feasible alternative.

7. Production-Oriented Supply Chains

Production-oriented supply chains have a one point agenda; produce to optimize the capacity and labor. All other activities precede production. This is mostly found where low value items are made and sold through various channels. Hence, marketing and distribution are relatively the non-issues.

8. Financial-Oriented Supply Chains

Financial-oriented supply chain or more fondly known as cash to cash cycle chain provides a company with negative working capital (accounts receivables plus inventories less accounts payables). This leaves a company with high cash holding for use elsewhere. Goods flow quickly. Upon demand, they are converted or distributed and sold to customers who pay before the suppliers accounts payable is settled. This chain emphasizes a financial goal first, and then logistics and planning are built from that end. This was found in big companies particularly in the fast moving consumer goods sector.

9. Market-Oriented Supply Chains

Market-oriented supply chains or customer supply chains are the typical built-to-order type of chains that get triggered when the customer places an order. Most commonly found in computer hardware sector, and other sectors which are dominated by consumer tastes, these supply chains are highly responsive and agile.

10. Value Chains

Value chains are the ultimate integration that is aimed at total optimization and not optimization in parts. These supply chains also addressed allied issues such as waste disposal, improving productivity, etc. Not Very commonly found, but several companies have such ultimate supply chains on their agenda.

FLOWS IN SCM

SCM has come to focus on the need to comprehensively look at the flow of: value delivery to a customer. Value is delivered through the defined business activity of the organization in the form of goods and services. Apart from the value, flow, there are two associated flows in a supply chain: information and cash flow. A schematic view of this for a typical supply chain is given in figure.

1. Value Flow

This is the most obvious and visible part of the supply chain moving largely from the vendor to the customer. Physically, the flow manifests itself as goods flows and service flows. Goods flows constitute raw materials (including material being stored or transported), work process (including what is being converted and what is in between operations), finished goods (includes material being stored or transported), spares, etc. Occasionally, there could be small reverse flows of material due to returns, network or recycling. Service flows follow a similar sequence, but being intangible cannot be stored. This brings the transactions between actors more into focus.

2. Information Flow

This is a significant part of the supply chain in that it is the enabler and driver of the concept of a supply chain. It consists of flows both from vendor to the customer and from the customer to the vendor. The major components of the backward flow (against the direction of the major value flow) are inputs for forecasts, marketing plans, dispatch plans, production plans and procurement quantities and timing, orders from customers and dealers, quality feedback, warranties that are invoked, etc. In the forward direction (in the direction of the major value flow) there are important components like capacity estimates for plans, stocks available dispatch advises stock transfer notes, quality assurance reports, warranties, etc.

3. Cash Flow

This is the commercially significant part of the supply chain, which is largely in a direction opposite that of the major value flow. The major part of this flow is the money paid for goods and services received. But there are other features to the cash flow, such as credit periods/advances for payments from customers/dealers, and to vendors. Any credit/advance is with respect to the transfer of title and/or service delivery in the supply chain. The cash flow determines how a given value flow is financed by the various actors in the supply chain.

IMPORTANCE OF SCM

Importance if SCM can be elaborated with the help of the following points:

1. Costs are Significant

Over the years, several studies have been conducted to determine the costs of logistics for the whole economy and for the individual firm. There are widely varying estimates of the cost levels. According to the International Monetary Fund (IMF), logistics costs average about 12% of the world's gross domestic product.

2. Logistics Customer Service Expectations are increasing

The Internet, just-in-time operating procedures, and continuous replenishment inventories have all contributed to customers expecting rapid processing of their requests, quick delivery, and a high degree of product availability. The world-class competitors have average order cycle times (the time between when an order is placed and when it is received) of seven to eight days and line item fill rates of 90% to 94%.

3. Supply and Distribution Lines are Lengthening with Greater- Complexity

The trend is toward an integrated world economy. Firms are seeking, or have developed, global strategies by designing their products- for a world market and producing them wherever the low-cost raw materials, components, and labor can be found (for example, Fords. focus automobile), or they simply produce locally and sell internationally. ; In either of case, supply and distribution lines are stretched, as compared with the producer who wishes to manufacture and sell only locally. Not only has the trend occurred naturally by firms seeking to cut costs expand markets, but it is also being encouraged by political arrangements; that promote trade.

4. Supply Chain is Important to Strategy

Firms spend a great deal of time finding ways to differentiate their product offerings from those of their; competitors. When management recognizes that logistics affects a significant portion of costs and that the result of decision made about the supply chain processes yields different levels of customer service, it is in a position to use this effectively to penetrate new markets, 1 to increase market share, and to increase profits. That is, good supply chain management can generate sales, not just reduce costs. For example, Walt Mart used logistics as the core of its competitive strategy to become the world number one merchandise retailer.

5. Supply Chain/Logistics Adds Customer Value

A product, or service, is of little value if it is not available to customers at the time and place that they wish to consume it. When a firm incurs the cost of moving the product toward the customer or making an inventory available in a timely manner, for the customer value has been created that was not there previously. It is value as surely as that created through the production of a quality product or through a low price.

It is generally recognized that business creates four types of value in products or services. These are: form, time, place, and possession. Logistics creates two out of these four values. Manufacturing creates form value as inputs are converted to outputs, that is, raw materials are transformed into finished goods.

6. Customers Increasingly Want Quick, Customized Response

Fast food retailers, automatic teller machines, overnight package delivery, and electronic mail on the Internet have led individuals as consumers to expect that products and services can be made available in increasingly shorter times. In addition, improved information systems and flexible manufacturing processes have led the marketplace toward mass customization. Rather than consumers having to accept the size fits all philosophy in their purchases, suppliers are increasingly offering products that meet individual customer needs.

7. Logistics/SC in Non-Manufacturing Areas

It is perhaps easiest to think of logistics/SC in terms of moving and storing a physical product in a manufacturing setting. This is too narrow a view and can lead to many missed business opportunities. The logistics/SC principles and concepts learned over the years can be applied to such areas as service industries, the military and even environment management.

8. Service Industry

The service sector of industrialized countries is large and growing. In the United States, over 70% of all jobs are in what the federal government classifies as the service sector. The size of this sector alone forces to ask if logistics concepts are not equally applicable here as they are to the manufacturing sector. If they are, there is a tremendous untapped opportunity yet to be fulfilled.

9. Use in Military

Before businesses showed much interest in coordinating supply chain process's, the military was well organized to carry out logistics activities. More than a decade before business logistics developmental period, the military carried out what was called the most complex, best-planned logistics operation of that time the invasion of Europe during World War ll.

Although the problems of the military, with its extremely high customer service requirements, were not identical with those of business, these similarities were great enough to provide a valuable experience base during- the developmental years of logistics.

10. Linked with Environment

Population growth and resultant economic development have heightened the awareness of environmental issues. Whether it is recycling, packaging materials, transporting hazardous materials of refurbishing products for resale, logisticians are involved in a major way After all, the United States alone produces more than 160 million tons of; waste each year, enough for a convoy of top garbage trucks reaching halfway to the moon. In many cases, planning for logistics in environmental setting is no different from that in manufacturing or service; sectors.

DECISIONS IN SCM

Success supply chain management requires many decisions relating to flow of information, product, and funds. These decisions fall into three categories or phases, depending on the frequency of each decision and the timed frame over which a decision phase has an impact.

1. Supply Chain Design

During this phase, a company decides how to structure the supply chain over the next several years. It decides what the chain configuration will be, how resources will be allocated, and what process each stage will perform. Strategic decisions made by companies includes

a) The location and capacities of production and warehousing facilities,
b) The products to be manufactured or stored at various locations,
c) The modes of transportation to be made available along different} shipping legs, and
d) The type of information system to be utilized.

A firm must ensure that the supply chain configuration supports its strategic objectives during this phase. Dells decision regarding the1 location and capacity of its manufacturing facilities, warehouse, and supply; sources are all supply chain design or strategic decisions.

2. Supply Chain Planning

For decisions made during this phase, the time frame considered is a quarter to a year. Therefore, the supply chains; configuration determined in the strategic phase is fixed. This configuration} establishes constraints within which planning must be done. Companies start the planning phase with a forecast for the coming year (or a; comparable time frame) of demand in different markets. Supply Chain Planning Decisions includes,

a) Decisions regarding which markets will be supplied from which locations,
b) The subcontracting of manufacturing,
c) The inventory policies to be followed, and
d) The timing and size of marketing promotions.

Planning establishes parameters within which a supply chain will function over a special period of time.

3. Supply Chain Operation

The time horizon here is weekly or daily, and during this phase companies make decisions regarding individual customer orders. At the operational level, supply chain configuration is considered fixed and planning policies are already defined. The goal of supply chain operations is to handle incoming customer orders in the best possible manner. Supply Chain Operation Decisions related with,

a) Firms allocate inventory or production to individual orders,
b) Set a date that an order is to be filled,
c) Generate pick lists at a warehouse,
d) Allocate an order to a particular shipping mode and shipment,
e) Set delivery schedules of trucks, and
f) Place replenishment orders.

Because operational decisions are being made in the short term (minutes, hours, or days), there is less uncertainty about demand information. Given the constraints established by the configuration and planning policies, the goal during the operation phase is to exploit the reduction of uncertainty and optimize performance.

The design, planning, and operation of a supply chain have a strong impact on overall profitability and success. Continuing with the example, consider Dell Computer. In the early 1990's, Dell management began to focus on improving the design, planning and operation of the supply chain, with the result of significantly improved performance. Both profitability and the stock price have scared and Dell stock has had outstanding returns over this period.

CHAPTER 2

PROCESS VIEW OF SUPPLY CHAIN MANAGEMENT (SCM)

INTRODUCTION

Supply Chain Management process plays a huge significance in running key operations for almost every organization. Without a successful supply chain, processes could halt at the floor level and ultimately bring down the results. For so many decades, supply chains have gone through a journey of their own from being so simple to recently developed algorithm based ones. With ever-evolving supply chain concepts, supply chain management process has become a dedicated function. Supply chain managers are given the responsibility to ensure that supply chain, be it external or internal, is efficient and cost-effective both.

PROCESS OF SUPPLY CHAIN

Supply chain management is a process used by companies to ensure that their supply chain is efficient and cost-effective. A supply chain is the collection of steps that a company takes to transform raw materials into a final product.

A supply chain is a sequence of processes and flows that take place within and between different stages and combine to fill a customer need for a product. Two ways to view, the processes performed in a supply chain are as follows:

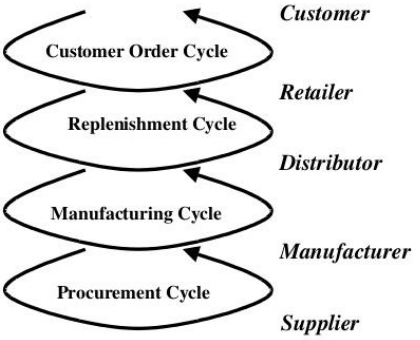
1. Cycle View
2. Push and Pull View

1. CYCLE VIEW

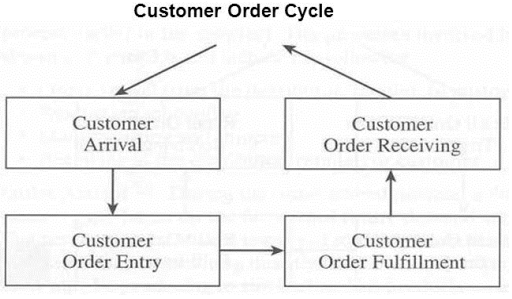
The processes in a supply chain are divided into a series of cycle, each performed at the interface between two successive stages of a supply chain. We]: view of supply chain process includes:

a) Customer order cycle
b) Replenishment cycle
c) Manufacturing or production and delivery cycle and
d) Procurement cycle

The cycle view of a network also assists in understanding the key operational processes necessary.



a) Customer Order Cycle



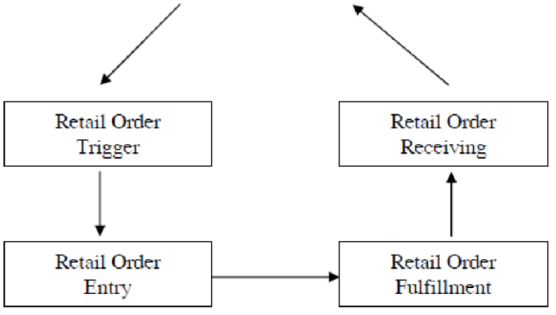
Usually at the customer interface and included all the processes directly involved in receiving and filling a customer order The customer will usually initiate the order and start the demand process The customer order cycle can be further broken-down into processes such as customer arrival, order entry, order fulfillment, and order receiving. The processes involved in the customer order cycle are shown in figure and include:

- Customer arrival,
- Customer order entry,
- Customer order fulfillment,
- Customer order receiving.

b) Replenishment Cycler

This will describe the interface between product provider and a first tier supplier replenishing the product. This cycle is initiated either by an order from the product provider or, more effectively, by the customer order in the first cycle. The first tier supplier is then tasked to replenish goods and services to demand at a minimum cost while providing the necessary quality

and product availability. The cycle includes the processes of order trigger (either by customer or product and service provider), order entry, order fulfillment and order receiving.



The processes involved in the replenishment cycle are shown in figure and include:

- Retail order trigger,
- Retail order entry,
- Retail order fulfillment,
- Retail order receiving.

c) Manufacturing Cycle

A process between producer of a good/service (a first tier supplier) and the product provider (in some cases the end consumer can directly interface with the producer). The cycle involves all the processes necessary to offer products for the replenishment cycle. The cycle will typically include order arrival (from distributor, retailers or end consumer), production scheduling (of good or service), production and shipping, receiving by service/product provider.

The processes involved in the manufacturing cycle is include the following:

- Order arrival from the finished-goods warehouse, distributor, retailer or customer,
- Production scheduling,
- Manufacturing and shipping,
- Receiving at the distributor, retailer or customer.

d) Procurement Cycle

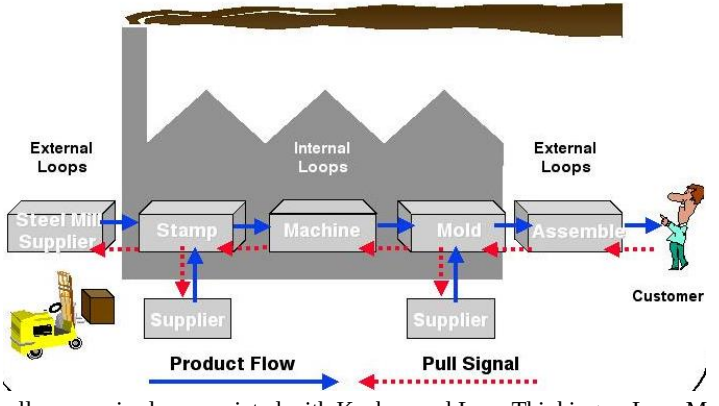
This is the interface between the first tier supplier (and the producer of a good) and the second tier supplier to that producer. It includes all the processes necessary to ensure materials or components are available for the production cycle and the first tier supplier. The second tier supplier provides inputs to replenish the production and delivery cycle. However, this supplier is operating more precise dependent demand based upon known quantities of the final finished product or service (rather than independent demand faced by the product provider and/or the first tier supplier). The cycle processes here will be similar to those of the production and delivery cycle.

2. PUSH AND PULL VIEW

The processes in a supply chain are dividing into two categories depending on whether they are executed in response to a customer order or in anticipation of customer orders. Pull process are initiated by a customer order, whereas push process are initiated and performed in anticipation of customer orders. In recent years, the trend toward more efficient operations has accelerated as technology transforms consumer choice, and consumer choice in turn affects corporate strategy. The consumer need-based business model is forcing a fundamental shift from a traditional manufacturing push-based model (also called build-to- stock) to a pull based model (build-to-order).

1. Pull Concept

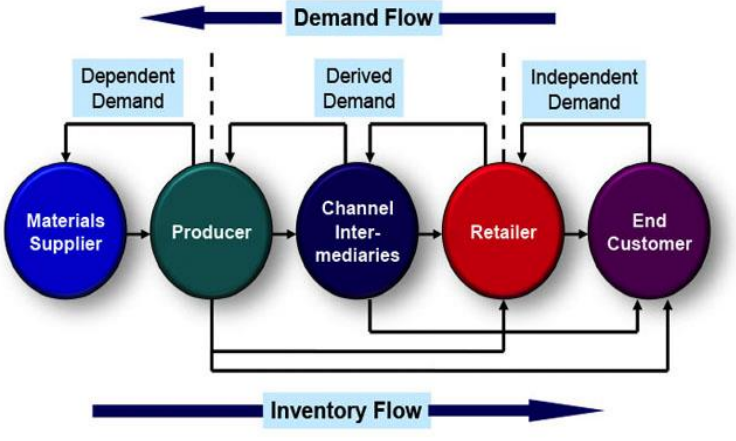
A pull process is activated in response to a confirmed order from a customer. This includes make to order or a Just-in-Time (JIT) manufacturing process. As shown in figure, in a pull process the supplier does not stock finished products but holds higher quantity of semi-finished materials and often higher supply capacity so that order fulfillment can be achieved rapidly. The orders arrive at or alter the planning cycle as if bypassing a few steps of the traditional ERP process.



A pull process is also associated with Kanban and Lean Thinking or Lean Manufacturing. In essence, lean manufacturing requires materials to arrive into each stage of production just when required and no buffer stocks of inwards or outwards stocks of materials are held. The lean approach is also referred to as JIT. Pull processes control the flow of resources in the production process by replacing only what has been consumed. Production schedules are based on actual demand and consumption rather than forecasts. With lean manufacturing there is no room for errors in specification, production or late delivery.

2. Push Concept

A push process conforms to a conventional supply chain management system going through typical stages in sequence. As shown in figure 1.7, orders arrive at or after the demand cycle but always before the planning and procurement cycle and process is activated by a forecast or demand plan. Both raw and packaging materials are stored before production and products are manufactured to stock. The order fulfillment is achieved from the inventory of finished products:



In push system; production and distribution are based on forecasts. The problem is that forecasts are often wrong. Customer or demand push is usually defined as a business response in anticipation of customer demand.

FACTORS INFLUENCING SCM

Various business and economic forces influence the effectiveness of a supply chain. They include consumer demand, globalization, competition, information and communication, regulation and environmental concerns.

1. Consumer Demand

The key focus of an organization is to find a balance between cost and quality, and customization and availability without compromising on any one of them. Customers Expectations with regard to quality, speed of service, choice, and price have increased significantly. So. Organizations have to make the products or services cheaper, better and available within the minimum possible time. The objective of supply chain management is to keep the customers satisfied by providing them with what they want, when they want it and at a price they can afford.

2. Globalization

Organizations are realizing the importance of benefiting from the competitive advantages of other economies. For example, American and European companies have realized the cost

benefits of outsourcing operations to Asian or Latin American. In these economics they are able to find skilled labors for action of price they have to otherwise pay in developed countries. Supply chain globalization is also the result of companies planning to take advantage of untapped foreign market.

3. Competition

Competition in every business has increased significantly over the last decade. It has increased due to advancements in technology, increased globalization, easy access to information, creative business designs, etc. These factors have dislodged many market leaders. Earlier, market share was a good measure of profitability, but now organizations are redefining their competitive space. For example, having a significant market share in the mainframe and minicomputer market cannot ensure the profitability of a company because of the change in the competitive space. Now, the market for PCs and workstations is much bigger than that for mainframes and minicomputers. Improvement in information flow and transportation has given even the small companies the competence to operate in international market with other big players.

4. Information and Communication

The improvements in information flow and communications systems are key forces providing support for supply chain decisions. The Internet is an application, which is redefining the way products are purchased, sold and distributed. It has given the customer access to information regarding every aspect of the product. Now, customers can evaluate and compare different products and then make a purchase decision. Many companies are purchasing and distributing products without distributors or resellers. The information explosion is facilitating the expansion of supply chain activities to different parts of the world.

5. Government Regulation

Governments have played a significant role in the evolution of the supply chain. The scope of supply chain activities is no longer restricted by national boundaries. An organizations supply chains decisions have to take into account the regulations and policies of other countries as well. Trade barriers, duties and other such trade related decisions are in the hands of governments of various countries. These rules and regulations directly affect the functioning of supply chain entities. With the formation of international trade organizations like the WTO, and other regional trade agreements, governments around the world are trying to bring in consistent regulations in all member countries.

6. Environment

Growing concern for the environment has made an imp ad on supply chain design. Many European countries have regulations regarding the usage of packaging material. Many organizations are designing products that can be recycled completely when their operational life is over. Government regulations to protect the environment also gaffed supply chain decisions.

PROBLEMS OF COMPLEXITY CONFRONTING SUPPLY CHAINS

There are 15 key thrust areas of SCM, which would lead to specific decision areas:

1. Minimizing Uncertainty

Supply uncertainty due to unreliability of vendors, process uncertainty due to internal processes and demand uncertainty are some of the major hurdles to effective SCM. Supply uncertainty can be addressed through a number of initiatives such as vendor development and certification, sharing of production planning information and joint attention to transport arrangements. Process uncertainty is due to machine breakdowns, uncertain yields and absenteeism, which can be addressed through good maintenance practices, better technology, etc. Demand uncertainty can be reduced to some extent by forecasting techniques and by better communication with customers.

2. Reducing Lead Times

Lead times at the stages of procurement, conversion and distribution can be cut down by faster modes of transport, better planning practices and process technologies.

3. Minimizing the Number of Stages

In general, the numbers of stages that goods and services flow through add to the complexity of SCM. Unification of tasks and reducing the number of stages make the coordination of decisions easier. This is the essence of another amazement concept namely Business Process Reengineering.

4. Improving Flexibility

Reducing set-up or changeover times in various processes and the use of flexible manufacturing and assembly techniques improves the flexibility of response In transport, the use of smaller vehicles provides flexibility in making dispatches at short notice without being constrained by batching economies. As an extended principle, wherever possible, batch processes should be made continuous processes.

5. Improving Process Quality

A prerequisite to effective SCM in the light of reducing inventories and wastage is to do things right the first time. This is ideal for improving process quality. The techniques for this include statistical process control, root cause analysis of poor quality and improvement of process capability.

6. Minimizing Variety

Variety is one of the major causes for inventory in the downstream part of supply chains. One response is to modular's prods designs so that variety is offered in a controlled way and some economies of scale can be exploited. Another is to standardize Product and service offerings.

7. Managing Demand

Uncertainty and anticipated variations in demand should be dealt with by appropriate promotion and branding. This will enable a better control of the supply chain, right from demand generation.

8. Delaying Differentiation

The value addition through product differentiation should be postponed as far as possible, so that precise customer needs can be met without holding committed stocks in the entire chain.

There are numerous examples of how this can be done, such as shipping of component level goods to major points and assembling according to customer needs, postponing finishing operations like grinding and mixing of additives to cement till near the final point of consumption, etc.

9. Kitting of Supplies

In assembly systems, a major source of delay is the staging delay where some components for assembly have to wait since matching components are not available. Vendors or internal facilities that supply components can be arranged so that all components required for an assembly for major sub-assembly) are manufactured or supplied to one stage where they are kitted into sets of matching components, ready for assembly and further operations. This could involve some restructuring of vendors or internal activities and some vertical integration.

10. Focusing on a Category

This is swell-known idea from classical economics and inventory theory, where items that account for a large part of the value, or which are critical, and/or customers that are significant, and/or territories that are important receive special attention.

11. Planning for Multiple Supply Chains

Doing better SCM would often require different supply chains for different customer segments based on response requirements. The tendency to club supply chains in the interest of efficiency can be counter-productive for effectiveness.

12. Modifying Performance Measures

These need to move from being single-actor focused to multi-actor focused in the supply chain. For example, in the context of a warehouse, instead of warehouse space utilization as the primary measure of warehouse performance, the retrieval time would be more in tune with SCM, since this focuses on both the warehouse and the downstream actor. Similarly, a transporter like the railways would focus more on time take for delivering a wagon/rake to a customer from the time the indent is placed, rather than wagon utilization/turn around.

13. Competing On Service

The big opportunity in SCM for long-term competitive advantage is on the service aspects of value delivery to the customer. Product quality and features can only be short-term advantages.

14. Moving from Functions to Processes

Improved supply chain practices will require integrated process orientation rather than functional organization. Job rotation, flatter and lean organizations will help.

15. Taking Initiatives At An Industry Level

This is very essential, especially in dealing with poor infrastructure. Industry-level (rather than firm-level) initiatives in specific product categories can focus on say transport and/or warehousing inadequacies and help develop appropriate service providers. There is a big opportunity for third party logistics services here.

ENABLERS OF SUPPLY CHAIN PERFORMANCE

In order to implement a supply chain successfully, there are some of the key enablers which help in the better performance of the supply chain management. The objective was to

identify, classify, and priorities key enablers that supply chain practitioners must leverage to capitalize on the benefits of SCM. These enablers are key to the problem, if they are not in place, alignment, and linkage will suffer.

The key enablers of supply chain management are as follows:

1. Communications and IT

Information and Communication Technologies (ICT) are one of the most important enablers of effective supply chain management. A great deal of interest in supply chain management stems from the availability of information and the methods to analyze this information to reach meaningful results. New opportunities exist as electronic business again importance, and especially the widespread use of internet is increasing the interest for the information technologies.

Effective management of material and financial flows is, therefore, predicated upon the effective management of the related information flows. For this reason Information and Communications Technology (ICT) is becoming an increasingly important SCM enabler.

Supply chain management consists of many functional areas in companies and it is affected by the communications of these groups. Information technologies are a source of competitive power for many companies. Especially for service industries such as big retailers, transportation companies, and airway companies where they have been started to widely use, information technologies have earned a vital role.

The time and opportunities to reach information are very important for supply chain management, which aims to increase Service level and decrease the costs and lead times. Along with this, many companies are offering information technologies-based services to their customers in order to gain competitive edge and sustain long-term relationships with them. Such a service offered by. a single company in an industry makes it an obligation for the rest of the companies competing in the same industry.

Relationship specific intangible investments play a mediating role linking SCM systems use to benefits. Evidence that patterns of information technology use are significant determinants of relationship-specific investments in business processes and domain expertise provides a finer-grained explanation of the logic of it enabled electronic integration.

The technologies used in different departments in the company differentiate from each other by the time. For successful supply chains it is vital to integrate and standardize these technologies.

2. Third-Party Logistics Providers

Outsourcing, third party logistics services (3PL) and contract logistics generally mean the same thing. It involves the 'use of external companies to perform logistics functions, which have traditionally been performed within an organization. The functions performed. by third party logistics service providers can encompass the entire logistics process or select activities within that process.

For any chain to perform well - whether it is a bicycle chain or a supply chain each link must be in sync and strong enough to handle the inevitable bump in the road. Manufacturers who have entrusted their supply chain to a 3PL supply chain responsibilities allows them to focus on

their core business of making, provider learn quickly that handing off these complex marketing, and selling quality products. In addition to solving common challenges, utilizing a 3PL provider helps to save costs, by closing any resource-draining holes in the system, bringing economies of scale to each leg of supply and allowing for seamless contraction or expansion. Simply put, outsourcing to an expert enhances supply chain performance and ultimately, everyone performance.

A 3PL supply chain provider pursues the latest technology to provide their customers with support throughout the supply chain. They understand the importance of product visibility every step of the way from manufacturing plant departure, transporting across continents and seas, all the way through the logistics channel to the customer.

3. Inter-Firm Coordination Capabilities

Inter-firm power often plays a critical role in the supply chain. A firm needs to develop effective coordination within and beyond its boundaries in order to maximize the potential v for converting competitive advantage into profitability. Coordinating the rate of order fulfillment to match actual consumption is successful from the customer point of view, if it results in satisfying a customer delivery date and lowers logistics costs. For example, Wall Mart shares point-of-sales data including sales and stocking data with its key suppliers. Tracking daily sales enables the suppliers to differentiate popular from slow moving items and to respond quickly either to replenish or to discontinue the items in retail stores. Tight coordination between Wal-Mart and its key suppliers dramatically increases product availability and reduces inventory costs.

Coordination among independent firms, such as raw material suppliers, manufacturers, distributors, third-party logistics providers and retailers, is the key to attaining the flexibility necessary to enable them to progressively improve logistics processes in response to rapidly changing market conditions. Poor coordination among the chain members can cause dysfunctional operational performance. Effective V coordination among different firm conceptually allows participants to recognize a significant competitive advantage derived from enhancements in responsiveness and cost reduction, leading to improved performance and profitability.

CHAPTER 3

PERFORMANCE MEASUREMENT IN SUPPLY CHAIN

INTRODUCTION

Irrespective of the size of operations, all business organizations, however small or big, need performance measurement and control for efficient and effective deployment of resources and tracking the health of the supply chain. For the concept of logistical integration to be practiced and results to be derived, a system of performance measurement and control needs to be designed on the criteria of rewards and penalty to performers. However, a well designed performance measurement system supported by logistics information will make cross functional coordination and integration easier.

When describing the performance measurement system, it is best compared with the control panel on the machine or the dashboard of a vehicle. Just as a control panel or dashboard gives vital information about the machine or vehicle, the performance measurement system gives insights into the financial and non-financial measures taken by the firm. However, it requires multiple measures to direct logistics operations for efficiency and effectiveness.

DEFINITIONS OF PERFORMANCE MEASUREMENT

Firms need to develop an entire system of meaningful performance measures to become and then remain competitive particularly when managing supply chains is one of the imperatives. Performance measurement is frequently mentioned as an important management task to achieve objectives. However, the question that arises is what actually comprises supply chain performance. Langley and Holcomb assign Supply chain management the role of supporting the creation of customer value. This is in line with the pull perspective defined above, with all decisions stemming from the final customer.

According to Neely, Gregory and Plats, “Performance measurement is the process of quantifying the efficiency and effectiveness of action”.

PMS are comprehensive accountability systems designed to measure and evaluate both financial and non-financial indicators to enhance visibility and transparency, Furthermore; organizations can set standards upon expected performance outcomes that influence individual, group, and organizational behavior.

PRINCIPLES OF PERFORMANCE MEASUREMENT

The principles of performance management are as follows:

1. Define Client Values

This requires all members of the supply chain (from end-users to manufacturers) to work together, using formal value management techniques, to define and record the detailed business needs of the end-users that must be delivered efficiently by the built solution.

2. Establish Supplier Relationships

The products and services of the specialist suppliers (sub-contractors, trade contractors and manufacturers) account for over 80% of the total cost of construction. It is therefore essential for the entire design and construction supply chain to establish better and more collaborative ways of working, so that the skills throughout the supply chain can be guessed and integrated to minimize waste of labor and materials.

3. Integrate Project Activities

This involves breaking down the construction activities into sub-systems or clusters. These are relatively independent elements of the whole building or facility, such as ground works, frame and envelope, mechanical and electrical services or internal finishes.

4. Manage Costs Collaboratively

This involves 'target costing' where suppliers work backwards from the client's functional requirements and gross maximum price (maximum affordable budget). The supply chain, particularly in the cluster groupings, work together to design a product that matches the required level of quality and functionality and provides a viable level of profit for all at the agreed target price (which must be within the gross maximum price).

5. Develop Continuous Improvement

The entire design and construction supply chain then agree continuous improvement targets for each firm's design or construction performance that will deliver maximum savings in underlying process and materials costs. The ultimate goal is to eliminate all the unnecessary costs that are caused by the ineffective utilization of labor and materials.

6. Mobilize and Develop People

All involved must recognize that their staff will need to learn new ways of thinking, acting and reacting. This involves unlearning old ways are recognizing the challenges to be met and the resistance and difficulties that can be expected.

ROLE/FUNCTIONS OF PERFORMANCE MEASUREMENT

These are the reasons why to measure performance:

1. Check Position

Measures allow management to understand how well the business is performing at present. This can include factors such as:

a) Attainment of present service goals (e.g., on-time deliveries, quality),
b) Costs versus revenues, and
c) Relative position (e.g., benchmarking).

This is vital if management is to detect problems and undertake remedial action.

2. Communicate Position

This ensures that stakeholders are aware of how the business is performing. It can include:

a) Financial reporting,
b) Returns to regulators, and
c) Reports to customers.

This builds up stakeholder support and establishes the legitimacy of the 0rganisation's activities.

3. Confirm Priorities

Setting targets for particular aspects of the business communicates that these things are important. It also knows that managers will focus on them because their ability to reach the targets will be part of senior management's assessment of their personal competence.

4. Compel Progress

Measures can do this in several ways:

a) Measurement Communicates Priorities

Managers always seek to do what is inspected' first before considering doing what is expected

b) Measurement may be linked to Reward

This may be formal as pan of a bonus scheme, or less formal in terms of better career progression for successful managers.

c) Measures Make Progress Explicit

If the goals of the business are not being reached, it is often the missing of certain key measures that forces management to act.

IMPORTANCE / OBJECTIVES OF MEASURING PERFORMANCE

A number of reasons exist for measuring and evaluating purchasing and Supply chain activity and performance:

1. Support Better Decision-Making

Performance measurement can lead to better decisions by making performance' and results visible. Measurement provides a track record of purchasing performance over time and directly; supports decision-making activity by management.

2. Support Better Communication

Performance measurement can result in better communication across the supply chain, including within purchasing, between departments, with suppliers, and with executive management. The measures that quantify supplier performance reflect a purchaser's expectations.

3. Provide Performance Feedback

Measurement provides the opportunity for performance feedback, which supports the prevention or correction of problems identified during the performance measurement process. Feedback also provides insight into how well a buyer, department, team, or supplier is meeting its performance objectives over time.

4. Motivate and Direct Behavior

Measurement motivates and directs behavior toward desired end-results. A measurement system can accomplish this in several ways:

a) The selection of performance categories and objectives indicates to purchasing personnel those activities that an organization considers critical.

b) Management can motivate and influence behavior by linking the attainment of performance objectives to organizational rewards, such pay increases.

ACTIVITY BASED PERFORMANCE MEASUREMENT (ABPM)

Activity-Based Performance Measurement (ABPM) can assess business performance at the activity level and then, aggregate these fine-grained metrics upward to the business unit and firm level. ABPM is more flexible and level insights gained during the measurement effort more effectively than traditional, project-based return on investment approaches. It also offers greater visibility into where in the supply chain 'benefits will be achieved, thus providing guidance f0f managing the Implementation and negotiating with supply chain partners.

ABPM MESURES

ABPM can be used to measure value created by new technology or management intervention. ABPM is based on two insights:

1. Calculating the costs of an activity is a matter of decomposing it into constituent parts, determining the cost of each part, and aggregating those costs. The benefits of an activity usually arise from how it affects other activities in the value chain. For example, quality programmers reduce product defects and so reduce costs associated with factory re-work and staffing customer service units.
2. There are common patterns in the types of benefits associated with activities that have similar underlying 'characteristics. For example, checking the quantity of goods is an activity that takes place at many junctures in the retail supply chain. Quantity checks of this sort occur at the receiving dock of the manufacturer's warehouse, when shipments arrive from the factory; at the' manufacturer's loading clock, when shipments are placed on trucks for transportation to the retailer; at the retailer's distribution centre, when the truck arrives; and so on, all the way to the point where the consumer makes a store purchase, and the clerk checks the quantity of each item in the shopper's cart.

Using ABPM to assess the impact of a new technology like RFID involves four primary steps:

a) Develop potential post-implementation scenarios.
b) Identify activities affected by the new technology.
c) Map the activities with versus without the new technology.
d) Measure benefits and» costs by comparing differences in outcomes of pre- versus post-implementation activities.

BENEFITS OF ABPM

There are two types of benefits - localized versus distant benefits.

- The benefits tied directly to the activities affected by new technology are localized benefits.
- Other benefits, by contrast, involve connections between activities directly affected and activities that occur within other units of the firm or even within outside firms.

PROCESS BASED PERFORMANCE MEASUREMENT

In this, a purview or overall view of the logistical system is evaluated. Activity based measures and process-based measures are compared. Let us consider the following example. There are clerical staffs in an organization that are deputed to take orders from customers. Their activity is measured in terms of the number of' orders they take. In case the number of order taken is high, it is deduced that the efficiency is high. But it could happen that the performance may be poor in terms of overall satisfaction of the customers.

Therefore process measures consider the customer satisfaction, which is delivered by the entire supply chain. They examine and analyze the total performance cycle time or the total service quality. Today, process measures are given more importance by firms in relation to activity-based measures.

Processes should be the foundation of a performance management system. The resulting framework would incorporate a balanced scorecard and strategic performance measurement principles and integrate a wide range of other management tools, such as ABC, BPR, Six Sigma and TQM. A process affects results in two ways:

a) The totality of the interconnections of all processes creates enterprise-wide performance result.
b) Each individual process has its own unique performance outcome.

Principles of Process-Based Performance Measurement

1. An in-control process delivers consistent and predictable results. A performance measurement system should never measure the results of a process. Use control charts for the process and each of its main activities -these instantaneously detect problems and point to their root causes, enabling immediate corrective action.
2. Performance targets are what the customer or executive team wants performance to be. A process can deliver performance only within certain limits depending on its capabilities. The two must be reconciled.
3. Performance measures should assess whether the desired outcome of a process is being achieved. A performance measure assesses progress relative to predetermined goals or objectives.

DIMENSIONS OF PERFORMANCE MEASUREMENT

There are three dimensions of performance measurement, namely:

1. Internal performance measurement
2. External performance measurement
3. Comprehensive Supply Chain Measurement

I INTERNAL PERFORMANCE MEASUREMENT

Internal performance measurement focuses on activities required to serve customers. It focuses on comparing activities and processes to previous operations and/or goals. Research suggests that logistics performance measures can generally be classified into these categories:

The most direct reflection of logistics performance is the actual cost incurred to accomplish specific operating objectives. Cost expectations are the essence of the budgeting process. Logistics cost performance typically measured in terms of total dollars, as a percentage of sales, or as a cost per unit of volume. It reflects in percentage, the actual cost incurred to accomplish a specific operating objective, by business units like manufacturers, wholesalers, retailers, etc. The typical cost performance measures are:

- Cost per unit,
- Warehouse costs,
- Inbound freight,
- Order processing,
- Cost as a percentage of sales,
- Administrative costs,
- Outbound freight, and
- Direct labor

2. Customer Service Measurement

The common set of logistics performance measures focuses on customer service. These measures, some examine a firm's relative ability to satisfy customers. It focuses on the customer service provided by the manufacturers, wholesalers, and retailers. Typically, these services include:

- Fill rate,
- Stock-outs,
- Shipping errors,
- On-time delivery,
- Back orders,
- Cycle time,
- Customer feedback, and
- Sales force feedback.

These measures examine a firm's relative ability to satisfy customers.

3. Productivity Measurement

Productivity is another measure of organizational performance. It is unclear whether it is the most important, or even necessarily a critical, measure of performance for all systems. It establishes a relationship (usually a ratio or an index) between output (goods and/or services) produced and quantities of inputs (resources) utilized by the system to produce that output.

The typical logistics productivity performance measures reported as used by manufacturers, wholesalers and retailers are:

- Units shipped per employee,
- Units per labor,
- Orders per sales representative,
- Comparison with historical data,

- Comparison with standards set, and
- Productivity index.

4. Asset Measurement

It focuses on the utilization of capital investments in facilities and equipment as well as working capital application to inventory to achieve logistics goal. Logistic facilities, equipment, and inventory, can represent a substantial segment of a firm's assets. In asset measurement, the focus is on how fast liquid assets such as inventory as well as how well fixed assets generate return on investment.

The typical logistics asset management measures, reported as percentage, used by manufacturers, wholesalers, and retailers are:

- Inventory turnover,
- Inventory carrying costs,
- Inventory levels (no. of days supply),
- Obsolete inventory,
- Return on net assets, and
- Return on investment.

5. Quality Measurement

Quality measures, which are the most process-oriented evaluations, are designed to determine the effectiveness of a series of activities rather than an individual activity. However, quality is usually difficult to measure because of its broad scope.

The typical quality measures, reported as percentage, used by manufacturers, wholesalers, and retailers are:

- Frequency of damage,
- Damage reported in rupees,
- Number of customer returns, and
- Cost of returned goods.

6. Performance Auditing

It is an assessment of the activities of an organization to see if the resources are being managed with due regard for economy, efficiency and effectiveness and accountability requirements are being met reasonably.

The scope of performance audits may include the detection of fraud, waste and abuse, although often these are not included in the scope. Prior to engaging in a performance audit, the auditor must have a scope and plan defined which will be used to guide the audit process.

Benefits of Performance Auditing

a) Promoting Good Governance, Accountability and Transparency

Performance auditing assists those charged with governance and oversight to improve their performance. It provides constructive incentives for the responsible authorities concerned to

take appropriate action. Performance auditing affords taxpayers, financiers, ordinary citizens, and the media an insight into the management and outcomes of different government activities.

b) Creating Mechanisms for Change and Improvement

In the private sector, a company's success can be assessed by its ability to generate a profit. A company that does not continually improve will ultimately be forced to leave the market. There is no similar mechanism in the public sector. While it is possible to reorganize activities in the public sector, and even close some agencies, even the most unsuccessful key ministry will keep some necessary functions. Performance auditing plays a role in highlighting problems and promoting change.

c) Contributing to Learning and Change and Serving as a Basis for Decision-Making

Performance auditors are not a part of the system they audit, which makes it easier to objectively listen to the views and knowledge of different stakeholders at different levels of the public administration. Decisions need to be made on how to prioritize different programmes and ministries. Performance auditing serves a basis for decisions on how to priorities and make better use of available resources.

7. Perfect Order

From an operational perspective, perfect order measures the effectiveness of the firms' overall integrated logistical performance rather than individual functions. It measures whether an order proceeds flawlessly through every step- order entry, credit clearance, inventory availability, accurate picking, on-time delivery, correct invoicing, and payment without deductions of the order management process without fault, be it expediting, exception processing, or manual intervention.

From a measurement perspective, perfect order performance is computed as the ratio of perfect orders during a given time period to the total number of orders completed during that period.

The perfect order represents the following standards:

a) Complete delivery of all items requested.
b) Delivery as required by customer with one-day tolerance.
c) Complete and accurate documentation supporting the order, including packing lists, bills of lading, invoices.
d) Faultless installation, correct configuration, no damage.

Various perfect order busters or common causes of failures are:

a) Order entry error,
b) Missing information, e.g., product code,
c) Non-availability of ordered item,
d) Inability to meet shipment date,
e) Picking error,
f) Inaccurate packing list/documentation,
g) Late shipment,
h) Late arrival,
i) Early arrival,

j) Damaged shipment,
k) Invoicing error/overcharging/deductions, and
l) Error in payment processing.

8. Service Levels

Service levels are the mechanisms for enabling the measurement of performance and are often linked to service response times, system performance times, and fix times for faults. When the company and its counsel are negotiating service levels, they should pay particular attention to those service levels that will affect the organization's core functions and its prime business indicators and how it will determine whether they have been achieved.

Performance measures are usually included with service levels, and the company with its providers must agree on them prior to signing an agreement. These should be clear, objective key, Performance Indicators (KPI) that are aligned with its strategic direction, are appropriate to the project, and provide readily understood signals of when the provider is succeeding and when improvement is needed.

Types of Service levels

a) Service Level

It is an event-oriented performance criterion. It measures the probability that all customer orders arriving within a given time interval will be completely delivered from stock on hand, i.e., without delay.

It differs with respect to the time interval within which the customers arrive. With reference to a demand period. Denotes the probability that an arbitrarily arriving customer order will be completely served from stock on hand, i.e., without an inventory-related waiting time (period up service level):

$\alpha p = P$ {Period demand $\leq$ Inventory on hand at the beginning of a period}

This criterion is also called ready rate. In order to determine the safety stock that guarantees a target up service level, the stationary probability distribution of the inventory on hand must be known. If an order cycle is considered as the standard period of reference, then on denotes the probability of no stock-out within an order cycle which is equal to the proportion of all order cycles with no stock-outs (cycle αc service level):

$\alpha c = P$ {Demand during replenishment lead time $\leq$ Inventory on hand at the beginning of the lead time}

The αc very often does not make much sense as it may be zero although there is a very high probability that a customer is served without delay. This happens in the case of long order cycles (i.e., with large order sizes).

b) β Service Level

The β service level (fill rate) is a quantity-oriented performance measure describing the proportion of total demand within a reference period which is delivered without delay from stock on hand:

$$\beta = 1 — E\{\text{Backorders per period}\} E\{\text{Period demand}\}$$

This is, equal to the probability that an arbitrary demand unit is delivered without delay. Due to the fact that, contrary to the variations of the α service level, the β service level does not only reflect the stock-out event but also the amount backordered, it is widely used in industrial practice.

c) γ Service Level

The γ service level, which is a time- and quantity-oriented performance criterion, serves to reflect not only the amount of late deliveries but also the waiting times of the backordered demands. The γ service level is defined as follows:

$$\gamma = 1 - E\{\text{Backlog per period}\}\ E\{\text{Period demand}\}$$

In contrast to the β service level, which can be quantified by looking at the size of the backlog immediately before the arrival of a replenishment order, the γ service level also reflects the development of the backlog in the preceding periods.

II EXTERNAL PERFORMANCE MEASUREMENT

External performance measurement of logistic activities of the firm refers to visualizing it from the customer and competition point of views. Thus, external performance measures involve two major aspects, namely:

1. Customer Performance Measurement
2. Competitive Performance Measurement

1. Customer Performance Measurement

Due to global competition and explosion of choices, the expectations of customers and end users are significantly increasing on a daily basis‘. It refers to regular measurement of customer perceptions that is obtained through Company or industry sponsored surveys or by systematic order follow-up. Hence, to survive in such a situation, it is essential to take into consideration the perception of customers regarding logistical performance so that improvements can be made in it.

The most important measurement of customer perceptions are regarding:

a) Availability,
b) Performance cycle length,
c) Information availability, and
d) Product support services.

Consultants, delivery agents or industry associations administer these measurements.

2. Competitive Performance Measurement

Companies use logistics and supply chain management to bring competitive advantage in the marketplace in the long-run. So, to achieve this objective, it is essential to measure the firm’s logistics performance with the competitors performance. This external performance measurement helps firm to innovate new tools and techniques of logistic activities to enjoy the overwhelming contribution of logistics as a differentiator.

The critical aspect of comprehensive performance measurement is benchmarking. More and more companies particularly manufacturers have adopted benchmarking as a technique to compare their operations.

III Comprehensive Supply Chain Measurement

In recent times, there has been an amazing increase in the focus on supply chain performance measurement that offers an integrated perspective. Without an integrated performance measurement system, it is not possible to achieve the corporate objective of state-of-the-art customer service and there is every possibility of gaps in it. To bridge the gap, a growing number of enterprises are realizing the need for strategic sourcing and supply management.

While developing an integrated supply chain performance measurement system, a consortium of firms, universities, and, consultants proposed a common framework. The integrated framework incorporates four types of metrics, namely; customer Satisfaction/quality, time, costs, and assets which monitors both outcomes and diagnostics for effective supply chain management, as shown in the table.

Outcomes	**Diagnostics**
Customer Satisfaction / Quality	
Perfect order fulfillment	Delivery-to-commit date
Customer Satisfaction	Warranty costs, returns and allowances
Product quality	Customer inquiry response time
Time	
Order fulfillment lead time	Source / make cycle time
	Supply chain response time
	Supply chain achievement
Costs	
Total supply chain costs	Value added productivity
Assets	
Cash-to-cash cycle time	Forecast accuracy
Inventory days of supply	Inventory obsolescence
Asset performance	Capacity utilization

The focus of outcome measures is on the overall process results in terms of customer satisfaction and time management process, whereas diagnostic measures deal with specific objectives within process.

CLASSIFICATION OF PERFORMANCE MEASURES ALONG SUPPLY CHAIN

The various measures that can be used for measuring various supply chain activities are as follows:

1. Price Performance Measures

Purchasing uses various indicators to evaluate price performance measures. In other words, how effectively it spends purchase dollars. The most common price performance measures include actual purchase price versus planned purchase price comparisons sir actual purchase price(s) compared to a market index, comparisons of actual: to-actual purchase prices for individual and aggregated items between operating plants or divisions within an organization, and target prices achieved.

2. Cost-Effectiveness Measures

The measures in this category focus attention on efforts to reduce purchase costs. Cost measures fall into two general categories i.e., cost changes and cost avoidance. A cost reduction based on mutual cooperation is the same, on paper, as a cost reduction resulting from heavy-handed pressure on a supplier.

3. Time-Related Measures

a) Time-to-Market Targets (New Products/Services)

This measure is the amount of time (weeks, months) from concept to first shipment/provision of a product/service to the external customer. The objective is continuous reduction so as to reduce the amount of time it takes to achieve break-even of investment, and also to be first to market with the product/service.

b) On-Time Delivery/Responsiveness

These measures indicate the degree to which suppliers are able to meet customer schedule requirements. Key elements for such measures include:

- Due dates i.e., schedule and/or promise.
- Delivery windows.
- Acceptable early/late arrivals to due dates (e.g., minus two days; no days late).

4. Technology/Innovation Measures

a) First Insights/Production Outputs of New Supplier Technology

This measure would typically link to a contractual agreement whereby, for new technologies, the firm may get insight some period of time before new technology developments are shared with other organizations. This may be an important focus in dealings with selected key technology suppliers to the firm.

b) Standardization and Use of Industry Standards

These measures focus on achieving standardization of components, systems, and services and application of currently used purchased items or industry standards versus creating unique items.

5. Administration and Efficiency Measures

Management uses administration and efficiency measures to plan purchasing annual administrative budget and to help control administrative expenses during a budget period. The two most common methods of establishing the purchasing administrative budget are as follows:

a) Current Budget plus Adjustment

Budget adjustments reflect management's View about projected purchasing workload and a firm's profitability. Decreasing workload or profits can result in a budget reduction.

b) Control Ratios

With the control ratio approach, the purchasing administrative budget is a percentage of another measure that reflects purchasing workload. Planned dollar expenditure for direct material is often the selected workload measure.

6. Metrics for Performance Evaluation

All the activities in a supply chain are triggered by customer order. Order processing is critical as the work of every other entity in the supply chain is based on specification given in order. Some of the order aspect which is measure for measuring the supply chain performance are:

a) Order Entry Method

The order entry method used by a firm should be capable of capturing and disseminating appropriate order specifications to various entities in a supply chain.

b) Order Lead-Time

Order lead-time or the total order cycle time is another metric which organizations can use to measure the effectiveness of their order procedures. Order lead-time refers to the time that elapses between the receipt of the customer order and the delivery of the goods.

c) Customer Order Path

The time and other resources utilized to fulfill a customer's order depend on the path traversed by an order. Tracing the path of an order enables the firm to eliminate the stages and activities that do not add value to the product.

7. Internal Customer Satisfaction

Companies are also applying measures that indicate the degree of satisfaction with purchasing value-add contribution. This is typically done by surveying internal customers and asking them to indicate their satisfaction with purchasing by responding to a series of check- off and open ended questions. Supplier satisfaction surveys and measures are also used.

8. Supplier Performance Measures

In addition, supplier performance measurement is an area in which many firms have made great progress. Supplier scorecards frequently contain many of the measures discussed is above. Purchasers generally track supplier quality, cost, and delivery along with other performance areas. Supplier total-cost measures allow direct comparisons between suppliers.

9. Strategic Performance Measures

Purchasing requires measures that reflect its ability to support overall corporate and functional goals, which means a reduced emphasis on pure efficiency measures and greater emphasis on effectiveness measures.

10. Logistics Metrics

The objective of logistics performance measurement is to determine whether or not the organization has improved customer service at lower logistics costs and a reduction in the cost of services. Some of the common measures are:

a) Overhead as % of total costs,
b) Overhead to cost of goods sold ratio,
c) Order fulfillment costs,
d) Order fulfillment costs as a % of order management costs,
e) Process Costs,
f) Total supply chain costs as a % of revenue,
g) Total supply chain-costs as a % of total costs.

TECHNIQUES OF MEASURING SUPPLY CHAIN PERFORMANCE

A variety of measurement approaches and techniques have been developed, in which the most prominent ones, as per the context, are given below:

1. SCOR Model

One of the more recognized methods for integrating supply chains and measuring trading partner performance is use of the Supply Chain Operations Reference (SCOR) model developed in l996 by supply- chain consulting firms Pittiglio Rabin Todd and McGrath and AMR Research.

The SCOR model is used as a supply chain management 'diagnostic, benchmarking, and process improvement tool by manufacturing and service firms in a variety of industries around the globe.

The model is designed to enable effective communication, performance measurement and integration of processes between supply chain members. Using the SCOR software, virtually any supply chain can be configured, evaluated, and benchmarked against best practices, leading to continuous improvements and sustainable competitive advantage for the supply chain's participating members.

2. Benchmarking

It is a process of comparing and measuring one's own business processes with those of business leaders anywhere in the world with a view to gaining information and understanding of their methods - and process, and then adopting it in the own organization for improving performance to a higher level.

Benchmarking is a tool that allows us to determine whether we are "On Course" or "Off Course" and measure progress in a very objective way. Benchmarking in Supply chain process enables the company to constantly monitor and assess its performance and operating techniques against other logistics practices both within a specific industry (retail, wholesale, etc.) and against best of class companies. The process is important to continuous improvement in an organization's service and expense levels.

3. Performance Prism (PPR)

The Performance Prism (PPR) developed by Neely and Adams, is organized around five distinct but linked perspectives of performance i.e., stakeholder satisfaction, strategies, processes, capabilities and stakeholder contributions.

The model looks at these five distinct, but logically interlinked, perspectives on performance together with five key questions for measurement design:

a) Stakeholder Satisfaction

The key question in this perspective is; who are the key stakeholders and what do they want and need? This perspective is broader than the BSC view of stakeholders, which is limited to shareholders and customers.

b) Strategies

What strategies do one has to put in place to satisfy the wants and needs of these key stakeholders; is the key question here? The performance prism's strategy measures monitor the success of the organization in meeting its goals.

c) Processes

The question defines, "What critical processes do firm require if they are to execute these strategies?"

d) Capabilities

The main question in this perspective is; what capabilities do firm need to operate and enhance these processes? Capabilities are fundamental building blocks of a corporation's ability to compete.

e) Stakeholder Contribution

This facet recognizes the fact that not only organizations have to deliver value to their stakeholders, but also that organizations enter into a relationship with their stakeholders, which should involve the stakeholders contributing to the organization.

4. Balanced Scorecard

The term balanced scorecard was coined by Robert Kaplan and David Norton of the Harvard Business School in response to the limitations of traditional accounting measures. Its purpose is "to translate strategy into measures that uniquely communicate your vision to the organization". Their version of the balanced scorecard consists of four perspectives:

a) Financial Perspective

Measures the ultimate results that the business provides to its shareholders. This includes profitability, revenue growth, and return on investment, Economic Value Added (EVA), and shareholder value.

b) Internal Perspective

Focuses attention on the performance of the key internal processes that drive the business. This includes such measures as quality levels, productivity, cycle time, and cost.

c) Customer Perspective

Focuses on customer needs and satisfaction as well as market share. This includes service levels, satisfaction ratings, and repeat business.

d) Innovation and Learning Perspective

Directs attention to the basis of a future success - the organization's people and infrastructure. Key measures might include intellectual assets, employee satisfaction, market innovation, and skills development.

5. Web-Based Scorecards

Today, a number of software applications are available to help design scorecards, which also link via the Web to a firm's enterprise software system. Web-based balanced scorecard applicators are also sometimes referred to as dashboards. These enable users to retrieve data easily from Enterprise Resource Planning (ERP) databases and also enable wide access by users at many locations, while providing desired security features.

6. Activity Based Costing (ABC)

ABC which emerged in 19805, improved on DPP, by recognizing both direct and overhead cost, ABC goes a step further by tracing the activity costs to objects consuming those activity cost. ABC analysis allows the managers to pin-point the activities, products, services or customers consuming overheads resources. ABC is an accounting technique that allows an organization to determine the actual cost associated with each product and service produced by the organization without regard to the organizational structure.

CHAPTER 4

SUPPLY CHAIN STRATEGY

INTRODUCTION

A firm supply chain strategy should ensure that its supply chain provides superior value to the end-customer in an efficient manner. Value offering (bundling of goods and services) to a customer should be available at a reasonable price. In almost all product categories, customers want more variety and quicker services at lower prices. Firms must recognize the nature of trade- offs between customer service and costs and arrive at an optimal decision on this front.

Supply chain strategy has a major impact on creating value for a company and its supply chain partners. An effective supply chain strategy may be formulated to meet the needs of the market and integrate them with technology to generate the highest level of customer satisfaction while delivering the highest value to the share holders.

From a value chain perspective, supply chain strategy specifies what operations, distribution, and service will try to do particularly well. Decisions regarding inventory, transportation, operating facilities, and information flows in the supply chain are all part of supply chain strategy.

An organization goals and strategic objectives should determine its overall supply chain management strategy. The SCM strategy in turn determines how the supply chain will perform with respect to efficiency and effectiveness.

FRAMEWORK OF SUPPLY CHAIN STRATEGY

Supply chain strategy is based on collaboration strategy, demand flow strategy, customer service strategy and technology integration strategy discussed as under figure 1.8:

1. Collaboration Strategy

Collaboration enables partners to jointly gain a better understanding of fixture product demand and implement more realistic programmed to satisfy that demand. Opportunities for collaboration among business partners will vary depending upon the organization perspective role in the supply chain. The three main types of collaboration are as follows:

a) Manufacturer/Supplier Collaboration

By collaborating with suppliers, 'manufacturers will derive benefits in activities such as product development, order fulfillment and capacity planning. Close collaboration among supply chain partners can be to align the parties and then enhance the value of the network combined activities. Collaborative product development enabled by sharing and modifying design documents will help manufacturers to develop products better and faster. Similarly, coordinating all tier-supplier production schedules will help to ensure that future material needs are satisfied. This, in turn, results in improved-order fulfillment and increased capacity utilization.

b) Manufacturer/Customer Collaboration

The focus is on jointly, developing an understanding of demand at the point of consumption, followed by creation of a mutually agreed upon replenishment plan. This approach helps to ensure that consumer requirements are met efficiently. The opportunities of collaboration between manufacturers and customers are focused on demand planning and inventory replenishment. This approach ensures that the customer requirements are met efficiently.

To collaborate on demand planning successfully, business partners need share and modify each other's demand plans and forecast electronically. Importantly each partner needs to understand and electronically share its promotional plans. Once demand plans and forecasts are in place, replenishment plans designed to assume adequate product availability would be jointly developed.

c) Collaboration with Third Party and Fourth Party Logistics Providers

The collaboration of companies with 3rd party logistics providers focuses on jointly planning logistics activities. It also gives the company the added advantage of better packaging. The 4th party logistics organization is one of the intermediate stages along the logistics spectrum that combine the beets of outsourcing and in sourcing.

With regard to transportation services, collaboration will improve equipment utilization by enabling the consolidation of inbound, inter- facility, and outbound shipments among business partners. This can be accomplished through electronic sharing of information on shipment plans and availability of transportation resources. Packaging is another potential area for logistics collaboration. Collaboration with 3PLs providing Distribution Centre (DC) services would focus on the productive use of facilities, labor, and equipment. This involves electronic sharing of inventory replenishment plan so that receipts do not. Overload (DC) receiving function or storage capacity. Electronic visibility into the availability of distribution centre resources would support that type of collaboration.

While outsourcing 3PL is now accepted business practice, fourth Party Logistic (4PL) is emerging as a breakthrough solution to modern supply chain challenges. The 4PL organization is one of the intermediate stages along the logistics spectrum that combines the benefits of outsourcing and in sourcing. It is usually established as a joint venture or long-term contract between at least two parties, consisting of the primary client(s) and at least one other partner, who contributes the start-up capital for the venture and also provide assets and expertise for ongoing operations.

2. Demand Flow Strategy

Traditionally in supply chain management, the key focus and scope has been in managing flow of goods from suppliers through the manufacturing and distribution chain to the customer. The key in demand management is the continuous flow of demand information from customer and end users through: distribution and manufacturing to suppliers. The shared objective of the chain is fulfilling customer demand. Customers can never be totally predictable but then a good demand flow strategy enables the company to simplify their supply chain operations.

The most important controlling inputs are rolling forecasts and plans, point of sales data, daily orders, management decisions, and performance feedback The controlling trigger of the chain is the customer order (or replenishment signal), and the order penetration point is varying dependent on what is the optimum my to provide a the required level of service in a most efficient way.

Customers will never be completely predictable; however, effective demand flow represents a significant and often unexplored opportunity for organizations to simplify their supply chain operations. It has the potential to provide significant benefits to organizations in the form of improved forecast accuracy, increased supply chain visibility, reduced supply chain costs, and minimized supply chain complexity and improved customer service levels.

Demand flow is a critical consideration for manufacturers, distributors, retailers, and other business partners. Yet despite the importance of demand planning and sales forecasting, channel design and proper supply chain configuration may lead to separate and disjointed forecast.

a) Channel Design

A number of structures exist through which the organization products and services reach the end-user consumer. While most organizations sell their products and services through retailers, wholesalers, dealers and distributors, advances in information and communication technology such as the internet and World Wide Web have fostered the development of an increasing number of direct channels whereby organizations sell directly to their end-user customers.

The structure of the channel or channel design is determined by the vertical length of the distribution channel the optimum breadth or intensity of the distribution coverage, and the market opportunities. The length of the distribution channel refers to the number of channel intermediaries who participate in the process of moving the product or service to the ultimate user.

Decisions about the breadth of the channel or relative intensity of distribution coverage involve the number (intensive, selective, and exclusive) and kind of retail outlets through which the product or service is offered to the customers and the number of intermediaries who will distribute to these outlets. This is a function of the product characteristics, buyer behavior, degree of manufacturer control, and competitive strategies.

b) Demand Planning

Determining the level of production and inventory required to meet end-user customer demand is a critical function at most firms. A formal approach to demand planning and management is essential. Whether the organization uses a sophisticated demand planning engine or simply produces forecasts by spreadsheet. Forecasting must be a collaborative effort not only among the sales, marketing, logistics, and finance department of the organization but also among at the supply chain partners. Distorted information may lead every entity in the supply chain the plant warehouse, a manufacturer shuttle warehouse, a manufacturers market warehouse, a distributors central warehouse, the distributors regional warehouse, and the retail stores storage space to stockpile because of the high degree of demand uncertainties and variability. This is because the organization projects the demand pattern on what it observes.

c) Supply Chain Configuration

Determining the optimal number, location and role of each supply chain partners is a critical element of the organizations overall supply strategy. The definition of the distribution network commits financial capital in the form of facilities, equipment and other assets, and establishes certain limit on the overall operating cost effectiveness of the firm and its supply chain partners.

Investigation of the supply chain configuration is thus to be based on efficiency (costs, revenues, and profits). Effectiveness (especially market shared), adaptability (liquidity of capital invested, ability to accept new products or adjust to new technologies), and supply chain objectives. Managers need to trade-off objectives in the same way customer trade-off for customer service to develop a realistic supply chain configuration.

d) Vendor Managed Inventory

Vendor Managed Inventory (VMI) has received much attention in the last few years as a critical means of improving the planning and demand forecasting process. Essentially, VMI addresses the question of how to use shared sales and inventory data among supply chain partners and who is responsible for supply chain sales and inventory level. The vendor and the wholesaler share the rest of process. The main operational problems from the vendor perspective are long lead-time in sourcing from manufacturers and high as a source of competitive advantage. In other cases, partnering might mean working collaboratively to share production, demand, capacity or product information order coordinate both partners activities.

3. Customer Service Strategy

Customer satisfaction level is directly proportional to the service provided by the company. The customer service can be seen a continuum between dissatisfied and delighted customer. The convergence being created by the information networks, has commoditized the product offering of the company as a result of which customers are increasingly inclined to demand higher standards of performance. They want organizations to add value to their time and trouble.

Formulating a customer service strategy involves addressing 3 steps, namely, customer segmentation, cost to serve and revenue management:

a) Customer Segmentation

A company has to decide on the segment it wants to target for a particular commodity. It can decide not to have a homogenous market which is unacceptable. One size does not at all. There is no such thing as a truly homogenous market, in which all customers view the organizations offerings in exactly the same way. The first step calls for researching what customers want from the buying process and then using their preferences to group customers into market segments. Customer services usually fall into five categories by lot size, market decentralization, waiting time, product variety, and service back-up. Once customers have traded-off one service Category with the other, managers 'can group these preferences into market segments and look for links between these segments suggested by surveyors, focus-groups, demographic analysis, and. analysis of large-scale customer information database.

b) Cost to Serve

It is important to obtain an impartial assessment of whether the things that the customers want are feasible for the company. It is also important to determine the kind of support needed from the suppliers or other parties in the supply chain. Finally, it is required to project the cost of the support system and its feasibility of execution.

c) Revenue Management

Revenue management is the process of determining the market share and price premium impact of the behavioral responses of customer to alternative levels of customer service. These behavioral responses include purchase, repurchase typically referred to as loyalty and recommendations (which influence the behavior of other customers). Analytical techniques include factor analysis, regression analysis, dynamic conjoint analysis, and other multivariate statistical techniques.

4. Technology Integration Strategy

Developments in IT enabled the integration of business information systems, both horizontally and vertically. A number of IT based supply chain information management tools are now available to provide intelligent decision support and execution management. The main SCM approach today deals with the integration of all elements of a customer service focused organizations.

While there is no single supply chain management solution, there are plenty of supply chain management products to choose from ranging from ERP systems to sophisticated supply chain planning tools and PC-based forecasting packages. In order to make a best choice of tools, companies must understand the capability of these tools, their interrelationships and the degree of integration between them:

a) Enterprise Resource Planning (ERP) Tools

Traditionally ERP tools were not considered under the umbrella of supply chain management tools. However, many companies now view ERP systems (e.g., Baan, SAP, 86 People etc.) as the core of their IT infrastructure on which to build their supply chain management solutions. tools have evolved out of a variety of products such as single plant Materials Requirements Planning (MRP) systems and financial systems. By adding information systems to cover other functional areas, such as order entry and plant maintenance, ERP systems have become enterprise-Wide transaction processing tools which capture data and reduce the manual activities and tasks associated with processing financial, inventory, and customer order information.

b) Internet-Based Supply Chain

In the last four years or so, the internet, World Wide Web and electronic commerce have become common business jargons. Much of the internet success can be attributed to its open standards, rapid adoption, and relatively low cost and standard graphical user interface. However, conventional supply chain management approaches have difficulty matching the cost-effective, dynamic, and customer-driven nature of internet-enabled approaches. Recognizing this, companies such as Federal Express, Amazon.com, Compaq, and Cisco have leveraged the internet to streamline their supply chains and to benefit channel partners and customers.

c) Internet and Supply Chain Transaction Processing

Conventionally the business community has used EDI to conduct exchange of information between its customers and/or suppliers. Unfortunately traditional EDI is expensive to implement and only the larger organizations have the economies of scale to benefit from EDI. The use of internet-based transaction processing promises to overcome these drawbacks and radically increase the effectiveness and efficiency of information exchange. Transaction processing may take the form of either a monetary exchange for a product or service or information exchanged between two organizations for decision-making or planning purposes.

STEPS IN ACHIEVING STRATEGIC FIT

Supply chain strategies are conducted under the umbrella of the corporate strategy of the organization. Competitive strategies are market- focused. Strategic it has to be achieved between the supply chain strategies and the competitive strategies adopted by the organization. The three core steps are considered in order to achieve the strategic it for Steps in Achieving Strategic Fit supply chain. These basic and core steps are as follows:

Step 1: Understanding the Customer and Supply Chain Uncertainty

Understand the customer by being customer-focused and recognizing the key requirements in each target segment they serve. The purpose of identifying customer segments is to identify similarities between groups of customers in order that their needs can be satisfied efficiently. Customers in different segments may have similar needs to other merits but most times the differences will be greater than the similarities Observed.

Where similarities are observed the supply chain structures and strategies may be similar and economies may be achieved by sharing com across the target segments. Where differences are identified there is less room to develop standard services across the target groups and the costs of supply chains may be higher as a consequence. However, it is not simply about coos: (but cost is important), it is about responsive supply chains. These are supply chains that are able to meet the challenges placed upon them by high-velocity changes in demand.

Fashionable clothing has the following attributes high variety, small volumes. Fast lead times in production and delivery, and changes offering new design and innovations are done quickly rendering old fashion obsolete. As a consequence there is. High implied demand uncertainty. If retailers were able to make a perfect forecast or, better still, not rely on forecast at all but act upon actual demand information, a situation whereby there was either excess inventory or excess demand that could not be fulfilled would never arise. Inventory would be scheduled to arrive in time to meet customer demand. Synchronization of these processes would be achieved more effectively thus increasing profitability.

This may be equally disturbing for retailers who have invested heavily in promoting merchandise and sales. In effect they will, have spent money "generating demand which they cannot fill but a competitor might. In effect they' have subsidized the competition. Retailers would like to .act on real demand and this means they need to have responsive suppliers. A responsive supplier in this context means one who is able .to make and delivers quickly to meet demand. This allows a retailer to postpone production until they are sure of demand, thus avoiding risk whilst

simultaneously not losing customers by not being able to meet excess demand. Wastage is eliminated in the supply chain; stock-holding risks (mark-downs, obsolescence) are removed and customer demand is met- efficiently.

The spectrum of arrangements might include low implied demand uncertainty for functional items through to high implied demand uncertainty owing to fashion. Goods arid Service with high implied uncertainty are often new with little direct competition, and as a result the profit margins and higher than those with lower implied risk. Forecasting is more accurate when demand patterns are more certain. Increasing implied, demand uncertainty creates difficulties in matching supply and demand. A stock-out or over-stock situation is likely as in the case of fashionable clothing. Overstocks lead to mark-downs or lost income through under-stocking, e.g., retail promotions.

Step 2: Understanding the Supply Chain and Capabilities

Understand the nature and structure of their own supply chains and how they respond under changing conditions in the market and the macro- and micro-environment. Market variables determine six key attributes of any supply chain structure and they are as follows:

a) Volume: Quantities demanded by the customer.
b) Time: The customer is willing to wait for fulfillment of the order.
c) Variety: Determines the number of suppliers.
d) Service Level Required: High, medium, or low product availability.
e) Price: How sensitive the product is to price changes.
f) Rate of Change, Innovation, and New Product Development: Customers buying fashion expect new products, whereas customers buying: standard apparel that is functional do not.

Understanding the customer is only the first step to designing strategic it Meeting demand is the next step. The question is how responsive is the supply chain to the customers demand Supply chains have many different characteristics but all supply chains have two important attributes cost and service. In this respect we can equate service with responsiveness rather than a narrower definition of service level availability. Supply chain responsiveness is a measure of ability to:

a) Respond to volume changes in demand;
b) Compress lead times (quick response or QR);
c) Deal with variety of products;
d) Build and deliver innovative new products quickly (QR); and
e) Achieve a high service level.

Supply chains displaying more of these characteristics are said to be more responsive. However, there is a trade-off between responsiveness and cost. For example, capacity may need to increase to deal with larger volumes and more variety, and hence this will incur higher cost. Every strategic decision to improve responsiveness will increase cost.

Step 3: Achieving Strategic Fit

After mapping the level of implied uncertainty and understanding the supply chain position on the responsiveness spectrum, the third and final step is to ensure that the degree of supply chain responsiveness is consistent with the implied uncertainty. The goal is to target high responsiveness for a supply chain facing high implied uncertainty, and Efficiency for a supply chain facing low implied uncertainty.

Putting responsive and efficient supply chains as a trade-off recognizes. That different level of responsiveness has associated cost implications efficient organization may be less responsive. Take the case of a textile mill it has time to plan production to ensure that volumes achieve economies of scale and the customers have been accustomed to waiting, so speed of response has been less important for large volume operators. At the other end of the spectrum the QR apparel manufacturer employed to get replenishment items into fashion retail stores in 2 or 3 weeks is under a time pressure and efficiency in terms of cost and economies of scale is less important to the retail customer than ensuring that they do not miss the selling period.

Understanding what the customer needs and designing supply chain strategies that can meet their needs is what customer-focused supply chains are all about.

In the two examples, both achieve a strategic it in terms of their competitive strategy. The large textile mill competitive strategy is to have large volume orders to gain economies of scale to minimize operational costs and offer customers best prices. Because the mill can be reasonably certain regarding the implied demand it is more focused on achieving efficiencies which are valued by its customers rather than responsiveness which would cost more and which the customers may value less than the price paid. In the case of the QR fashion manufacturer speed of response is highly valued by the retail customer so that they do not miss the season sales.

CHAPTER 5

SUPPLY CHAIN DRIVERS AND METRICS

INTRODUCTION

The strategic it requires that a company's supply chain achieve the balance between responsiveness and efficiency that best meets the needs of the company's competitive strategy. To understand how a company can improve supply chain performance in terms of responsiveness and efficiency, one must examine the logistical and cross-functional drivers of supply chain performance facilities, inventory, transportation, information, sourcing, and pricing. These drivers interact with each other to determine the supply chains performance in terms of responsiveness and efficiency. As a result, the structure of these drivers determines if and how strategic fit is achieved across the supply chain.

For example, consider the furniture industry in the United States. Low-cost furniture sourced from Asia is available at many discount retailers. The primary goal of this supply chain is to deliver a low price and acceptable quality. Variety is typically low and retailers such as Wal-Mart stock inventory of finished goods. The low variety and stable replenishment orders allow furniture manufacturers in Asia to focus on efficiency. Given the available inventory, low-cost modes of transportation from Asia are used.

DRIVERS OF SUPPLY CHAIN PERFORMANCE

The performance of a supply chain, both its efficiency and responsiveness, depends upon the following six drivers as follows:

1. Facility

It is the place where utility is added to convert the inputs. Here inventory is either processed to another form or stored before being transported to the next partner of the chain. A facility of a supply chain may be a factory, warehouse or a retail store.

The number of facilities and the capacity of each one of them affect the efficiency and responsiveness of the supply chain. A centralized facility with large capacity increases efficiency by providing economies of scale. However, probably the facility will cater to customers at far off places and this decreases responsiveness. Similarly, locating a number of facilities close to potential customers will be more responsive, but less efficient. Excess capacity in facilities will be useful to meet wide actuations in demand (better responsiveness). However, excess capacity needs more investment and is therefore less efficient.

If the competitive strategy of the firm is to target customers who can tolerate response time, it may be possible to have centralized facilities with large capacity. However, for customers unwilling to wait, it is required to locate facilities close to customers. Such firms will have many facilities, each facility with limited capacity.

2. Inventory

It is stored by all supply chain partners suppliers, manufacturers, distributors, and retailers. The quantity of inventory and its location affects the efficiency and responsiveness of chain. For example, for readymade garments, responsiveness requires more inventory with the retailer as it will help a customer to visit a retailer and walk-out with his choice of garment. However, if inventory is kept upstream, a customer will not get what he wants. He may be persuaded to place his order and wait for his order to be processed and delivered. Such a supply chain is not responsive. If the competitive strategy requires a responsive supply chain, large amounts of inventory may be placed close to the customer

3. Transportation

Transportation in a supply chain is movement of material from one partner to another. Faster transportation adds to responsiveness at the expense of its efficiency. A company with a number of retail stores may have its own fleet of vehicles for transporting material from one store to another store.

An organization can use many different methods of transportation to move its inventories between the different stages in the supply chain. Like the other supply chain drivers, transportation cost has a large impact either way on effectiveness and efficiency. If an organization focuses on a highly effective supply chain, then it can use transportation to increase the price of its products by using faster, more costly transportation methods. If the focus is a highly efficient supply chain, the organization can use transportation to decrease the price of its products by using slower, less costly transportation methods.

4. Information

Information connects various supply chain stages and allows them to coordinate activities. Information is crucial to the daily operations of each stage of the supply chain. An information system can enable a firm to get a high variety of customized products to customers rapidly. An information system can enable a firm to understand changing consumer needs more efficiently.

5. Sourcing

It is the choice of who will perform a particular supply chain activity such as production, storage, transportation, or the management of information. At the strategic level, these decisions determine what functions a firm performs and what functions the firm outsources. Sourcing decisions affect both the responsiveness and efficiency of a supply chain.

Supply Chain Drivers	Responsiveness	Efficiency
1. Production	- Excess capacity - Flexible manufacturing - Many smaller plants	- Little excess capacity - Narrow focus - Few central plants
2. Inventory	- High inventory levels - Wide range of items	- Low inventory levels - Fewer items
3. Location	- Many locations close to customers	- Few central locations serve wide areas
4. Transportation	- Frequent shipments - Fast & Flexible modes	- Few large shipments - Slower and cheaper modes
5. Information	- Collect & share timely and accurate data	- Cost of information drops while other costs rise

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6. Pricing

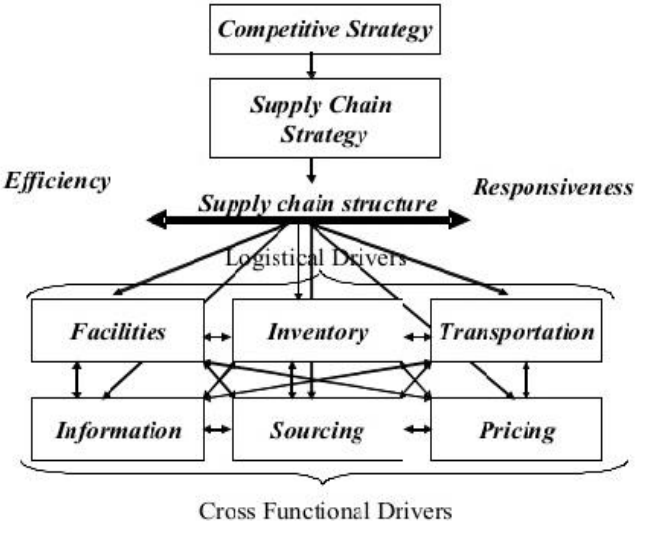
It determines how much a firm will charge for goods and services that it makes available in the supply chain. Pricing affects the behavior of the buyer of the good or service, thus affecting supply chain performance.

For example, if a transportation company varies its charges based on the lead time provided by the customers, it is very likely that customers who Value efficiency will order early and customers who value responsiveness will be willing to wait and order just before they need a product transported. Differential pricing provides responsiveness to customers that value it and low cost to customers that do not value responsiveness as much.

SUPPLY CHAIN DRIVERS FRAMEWORK

The ultimate aim of a supply chain is to find an optimum balance between the efficiency (reduced cost e.g., contractions of distribution centers) and the responsiveness (Closer to customer e.g., expansion of distribution centers). To understand how a firm can improve supply chain performance in terms of its responsiveness and efficiency, one needs to examine the framework of supply chain drivers as shown in figure.

The Supply chain has to utilize the three logistical functional drivers and the three cross functional drivers in order to reach the performance level that the supply chain strategy denotes and maximize the supply chain profits. For example, the world's best known retailer Wal-Mart uses all six drivers to achieve the right balance between efficiency and responsiveness so that its competitive strategy and supply chain strategy can be in the harmony.



1. Facilities

Facilities are the places in the supply chain network where inventory is stored; parts are fabricated and assembled into finished goods. Decisions regarding the location of the facilities (plant), their capacity and the flexibility of the facilities have a major impact on the performance of the supply chain. For example, an automobile firm can locate its spare parts distributors and service centers close to customers to increase responsiveness at the cost of efficiency. On the contrary, fewer spare parts distributors and service centers may increase the efficiency of the supply chain network at the cost of its responsiveness.

The facilities are concerned with where of the supply chain, while inventory is what is being transported along the supply chain and transportation is how it is moved. Facilities are tire locations to or from which the inventory is moved (facilities include manufacturing plants and warehouses).

The supply chain performance in terms of responsiveness and efficiency is greatly influenced by facilities and their capacities to perform their functions.

Components of Facility Decision

There are three primary components an organization should consider when determining its facilities strategy:

a) Location

An organization must determine where it will locate its facilities, an important decision that constitutes a large part of its supply chain strategy. Centralize the location to gain economies of scale, which increase efficiency; or decentralize the locations to be closer to the customers, which increase effectiveness.

b) Capacity

An organization must determine the performance capacity level for each of its facilities. If it decides a facility will have a large amount of excess capacity, which provides the flexibility to respond to wide swings in demand, then it is choosing an effectiveness strategy. Excess capacity, however, costs money and can therefore decrease efficiency.

c) Operational Design

An organization must determine if it wants a product focus for its facilities operational design, if it chooses a product focus design, it is anticipating that the facility will produce only a certain type of product. All operations, including fabrication and assembly, will focus on developing a single type of product. This strategy allows the facility to become highly efficient in producing a single product.

2. Inventory

All raw materials, work-in-progress and finished goods within a supply chain are referred to as inventory. Any change in inventory policies can greatly affect the efficiency and responsiveness of the supply chain. Decisions such as how much to store and where to store (in the firms premises or warehouses or at the retailer premises). For example, a retailer can quickly meet a customer demand by keeping a large inventory of an item, but it will increase the retailer cost, thereby affecting its efficiency even though responsiveness has increased. On the contrary, reducing inventory will increase the retailer's efficiency but will affect its responsiveness.

Inventory occurs in a supply chain because of the mismatch between supply and demand. Inventory plays an important role in the supply chain to increase the amount of demand that can be satisfied by having the product ready and available when the customer wants it. Also inventory plays a significant role in reducing the cost of the product by exploiting any economics of scale that may exist during both production and distribution.

Components of Inventory Decision

There are two facets of inventory an organization should consider when determining its Inventory strategy:

a) Cycle Inventory

Cycle inventory is the average amount of inventory held to satisfy customer demands between inventory deliveries. A company can; follow either of two approaches regarding cycle inventory. The firm 5 approach is to hold a large amount of cycle inventory and receive Y inventory deliveries only once a month. The second approach is to hold a small amount of inventory and receive orders weekly or even daily. The trade-off is the cost comparison between holding larger lots of inventory for an effective supply chain and ordering products frequently for an efficient supply chain.

b) Safety Inventory

Safety inventory is extra inventory held in the event demand exceeds supply. For example, a toy store might hold safety inventory for the Christmas season. The risk a company faces when making a decision in favour of safety inventory is that in addition to the cost of holding

it, if it holds too much, some of its products may go unsold y and it may have to discount them after the Christmas season, in the toy store. However, if it holds too little inventory it may lose sales and risks losing customers. The company must decide if it wants to risk the expense 3 of carrying too much inventory or to risk losing sales and customers.

3. Transportation

Inventory has to be moved from point-to-point in the supply chain using transportation facilities taking the form of many combinations of modes (multi modal) and routes, each having its own performance characteristics. In responsiveness and efficiency of the supply chain is significantly affected the choice of transportation modes and routes (affecting the speed and cost transportation). Hence, decisions regarding issues related to how to moves product from one location to another and by what mode of transportation usually trade-off decisions. It is necessary to evaluate economies on one ham and the desired level of customer satisfaction on the other.

Transportation is concerned with the movement of the product between different stages in a supply chain. Like inventory, transportation too has a great impact on both responsiveness and efficiency of the supply chain. The speed 0 transportation (time taken to move the material between two points, i.e., source and destination) depends on the mode of transportation and the quantity (v01ume and weight) of the product being transported. Also the type 0 transportation a firm uses affects the inventory and facility locations (plants and warehouses) in the supply chain.

4. Information

Information consists of data and analysis regarding inventory, facilities (location, capacities, etc.) transportation and customers throughout the supply chain. Information affects each of the other drivers and hence is the biggest driver of supply chain performance. Information is helpful in making the supply more efficient and responsive at the same time. For example, information regarding customer demand patterns results in more accurate forecast of demand, which in turn will enable a firm to produce the required quantity of the product at the right time to meet customer demand. This makes the supply chain more responsive and yet efficient.

Information even though not having a physical presence, deeply affects every part of the supply chain in many ways:

a) Information connects various stages of the supply chain and allows them to coordinate their actions and provides many benefits of maximizing total supply chain profitability.

b) Information plays a crucial role in day-to-day operations of each stage in a supply chain. For example, a production scheduling system uses information on demand to create a schedule that allows the manufacturing plant to produce the right products in the right time to meet the demand.

Importance of information as a driver of supply chain performance has grown recently because of the developments in information technology.

5. Sourcing

Sourcing is the choice of who will perform a particular supply chain activity such as production, storage, transportation, or the management of information. The strategic level, these decisions determine what functions firms perform and what functions the firm outsources. Sourcing decisions affect both the responsiveness and efficiency of a supply chain. After Motorola outsource much of its production to contract manufacturers in China, it saw its efficiency improve but its responsiveness suffer because of the long distances. To make up for the drop in responsiveness, Motorola started flying in some of its cell phones from China even though this choice increased transportation cost.