"Chapter 1: The Evolution of Logistics and Supply Chain Management (SCM)

Objectives

- Understand the evolution of logistics and supply chain.
- Identify the general structure of supply chain.

1. Introduction

In recent years, the area of Supply Chain Management (SCM) has become very popular. This is evidenced by marked increases in practitioner and academic publications, conferences, professional development programs and university courses in the area. While interest in SCM is immense, it is clear that much of the knowledge about SCM resides in narrow functional silos such as purchasing, logistics, IT and marketing. This growing area of knowledge needs more attention; first of all, there isn't any manuscript considering the new eras of this discipline; in addition, most of the existent texts concentrate on the missing theoretical aspects and empirical evidences. This chapter introduces logistics and SCM and contains some primary definitions about these two concepts.

2. The Evolution of Logistics and Supply Chain Management

The name of SCM is taking the logistics area by storm since so many in various business fields seem to embrace it and see activities of their areas imbedded in it. The origin of the name seems a mystery and exactly what is SCM, compared with physical distribution and logistics, is being debated. Some are saying that it is a fulfillment of the activity integration promise implied in early definitions while others think it is a new and bold concept. Those believing that SCM is evolutionary construct a diagram of the type shown in Figure 1-1.

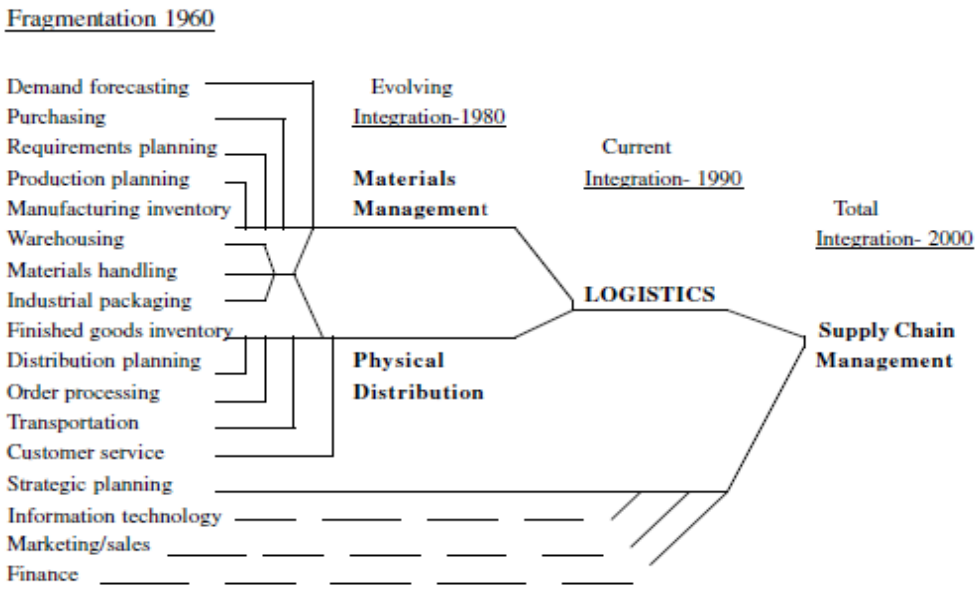

Figure 1-1: Evolution of supply chain management

Source : Ballou (2007)

In typical supply chain, raw materials are procured, and items are produced at one or more factories, shipped to warehouse for intermediate storage, and then shipped to customers. Consequently, to reduce cost and improve service levels, effective supply chain strategies must take into account the interactions at the various levels in the supply chain. The supply chain, which also referred to as the logistics network, consits of suppliers, manufacturing centers, warehouse, distribution centers, and retail outlet, as well as raw material, work-in-process inventory, and finished products that flow between the facilities. Figure 1-2 shows the general supply chain structure.

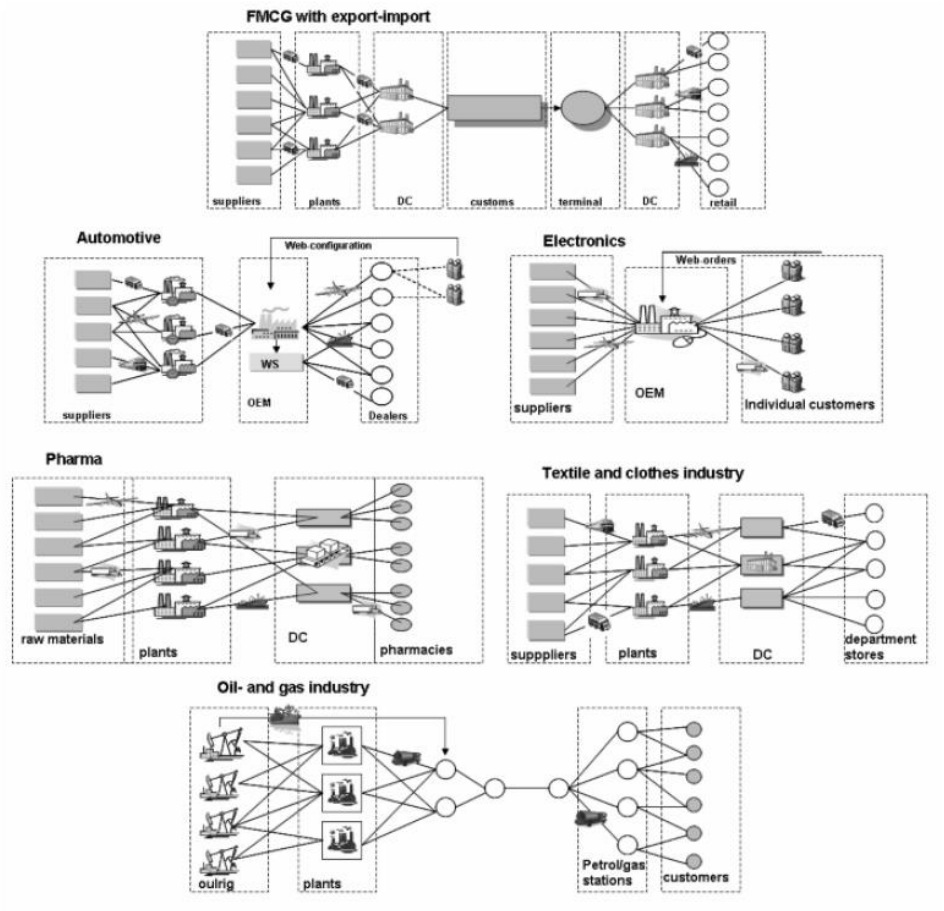

Figure 1-2: General Supply Chain Structure

Source : Ivanov and Sokolov (2010)

3. Conclusion

a. In typical supply chain, raw materials are procured, and items are produced at one or more factories, shipped to warehouse for intermediate storage, and then shipped to customers.

b. Consequently, to reduce cost and improve service levels, effective supply chain strategies must take into account the interactions at the various levels in the supply chain.

c. The supply chain, which also referred to as the logistics network, consits of suppliers, manufacturing centers, warehouse, distribution centers, and retail outlet, as well as raw material, work-in-process inventory, and finished products that flow between the facilities

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Chapter 2: Supply Chain Management (SCM) vs Logistics

Objectives

- Understand the definition of Logistics and Supply Chain Management
- Identify four conceptual perspectives on SCM vs Logistics

1. Introduction

SCM has inspired a new Council of Logistics Management (CLM) definition of logistics as ‘‘that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers’ requirements. But there is lack of agreement on how SCM is related to logistics.

2. Conceptual Perspectives

Following are four conceptual perspectives on SCM versus logistics: traditionalist, relabeling, unionist and inter-sectionist. The perspectives are discussed briefly below and shown in Figure 2-1. The authors identified these perspectives while reading and discussing the growing SCM literature.

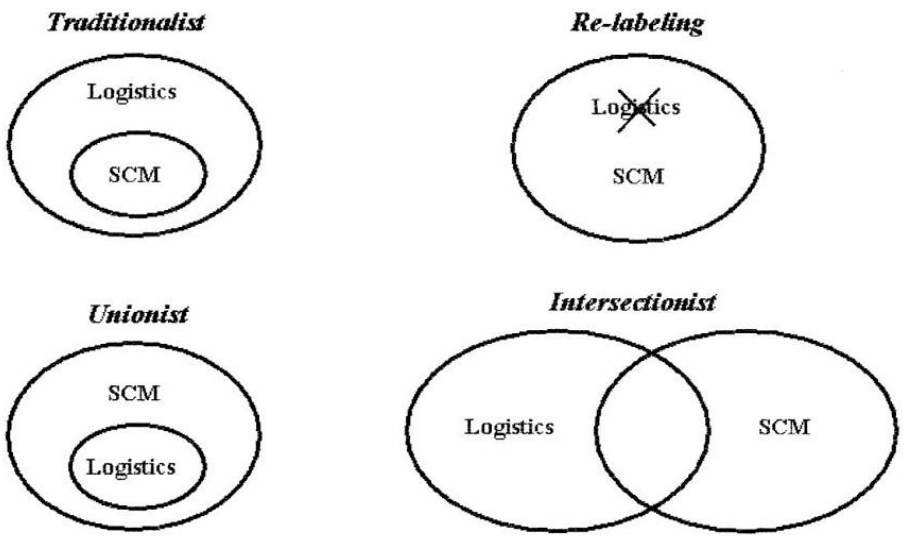

Figure 2-1: Perspectives on Logistics versus Supply Chain Management

Source : Larson and Halldorsson (2004)

Traditionalist

The traditionalist postions SCM with in logistcs, i.e. SCM is one small part of logistics. Educators can easily accomplish this by adding a SCM lecture to the logistics management course, or by inserting a SCM chapter into a logistics text-book. Of course, logistics textbook authors who add a SCM chapter are not necessarily traditionalists. Stock & Lambert (2001) observed that the logistics community has tended to view SCM as ‘‘logistics outside the firm’’. This reduces SCM to a special type of logistics, external or inter-organisational logistics. Traditionalist practitioners may create new ‘‘SCM analyst’ ’ positions with in the logistics group. SCM analysts would broaden the scope of logistics analysis, per-haps linking the logistics effort to other functions within the firm, as well as other firms in the supply chain.

Relabelling

The relabelling perspective simply renames logistics; what was logistics is now SCM. Leenders & Fearon (1997) describe ‘‘logistics management, or supply chain management’’ as an organizational strategy. Tan et al. (1998) discuss an evolution of logistics into ‘‘integrated logistics’’, which is now often called

‘‘SCM’ ’. Moreover, according to Jones & Riley (1985), SCM techniques ‘‘deal with the planning and control of total materials flows from suppliers through end users’’. This notion of SCM overlaps heavily with the CLM definition of logistics. More recently, Simchi-Levi et al. (2000) confessed that they ‘‘do not distinguish between logistics and supply chain management’’. They also use supply chain and logistics network as synonymous terms. Relabeling narrows the scope of SCM , since SCM equals logistics. In the world of logistics practice, last year’s ‘‘logistics analyst’ ’ may be this year’s ‘‘SCM analyst’’, with no change in job description. Gammelgaard & Larson (2001) reported results of a survey of supply chain managers. The survey included the following open-ended question: ‘‘Please briefly describe what a supply chain manager does’’. A large group of responses to this question reflected the relabelling perspective (supply chain manager as logistics manager). A selection of such responses follows. Following each definition, the respondent’s industry is in parentheses. A supply chain manager ‘‘manages all of, or a portion of, the process of getting the right product to the right place at the right time in the right quantities for the right cost with the right quality’’ (multi-level market ing or MLM company); ‘‘SCMs coordinate the flow between factory and the customer’’ (consumer packaged goods manufacturer); SCM ‘‘innovates, transforms logistics processes into strategic advantage’’ (retailer); ‘‘a supply chain manager manages logistics activities within the supply chain ’’ (logistics service provider).

Unionist

This perspective treats logistics as a part of SCM ; SCM completely subsumes logistics. Giunipero & Brand (1996) expressed this view with the following statement: ‘‘SCM is more than logistics’’. In the extreme, SCM subsumes much of the traditional business school curriculum, including logistics, marketing, operations management and purchasing . According to Konezny & Beskow (1999), the components of SCM are: logistics (inventory, warehousing, packaging, distribution, transportation, customer service, purchasing ,

production planning and demand forecasting); strategic planning; information technology; marketing; and sales.

Others develop SCM as an interdisciplinary concept drawing on fields such as marketing, economics, logistics and organizational behavior. Moreover, New (1997) concluded that it is important to study social, political and ethical aspects of SCM. For some authors, the term ‘‘SCM’ ’ alone is not enough! For instance, Sandelands (1994) defines total SCM as ‘‘gathering and exploiting quality information for all business areas, such as finance, marketing, and human resource planning’’.

Stock & Lambert (2001) suggest ‘‘supply chain management is the management of eight key business processes: (1) customer relationship management, (2) customer service management, (3) demand management, (4) order fulfillment, (5) manufacturing flow management, (6) procurement, (7) product development and commercialization, and (8) returns’’. These processes subsume or include much of logistics, purchasing, marketing and operations management. According to Mentzer et al. (2001), ‘‘all the traditional business functions should be included in the process of SCM ’’. In their model of SCM , these traditional business functions are marketing , sales, research and development, forecasting, production, purchasing, logistics, information systems , finance and customer service.

An organization adopting the unionist perspective might start by creating a new high- level position: Director or Vice President of SCM. At a minimum, logistics, purchasing and some elements of marketing would report to this SCM executive. Under a broader unionist regime (e .g. Stock & Lambert, 2001), the top supply chain manager would have CEO like responsibilities. Gammelgaard & Larson (2001) also found a large group of responses reflecting the unionist perspective (supply chain manager with broad duties). A selection of such responses follows. Again, following each definition, the respondent’s industry is in parentheses. Supply chain managers a reinvolved with ‘‘managing the flow of products, services, information and money across an extended enterprise — three or more companies : supplier , customer and focal company’’ (supply

chain consulting); ‘‘works with procurement, manufacturing, sales and customer service groups to ensure optimized flow of materials from our suppliers through our customers’’ (lubricant = chemical additive maker) ; ‘‘this position should be able to view the sourcing of raw material, transportation inbound to plants, warehousing and receipt, setting of raw material stock levels, finished goods stock level at plants, transportation to distribution centre (DC) or customer, stock level replenishment at DCs ’’ (casket manufacturer).

Inter-sectionist

Giunipero & Brand (1996) hinted at this idea with the following statement: ‘‘SCM is not a subset of logistics but is a broad strategy which cuts across business processes both within the firm and through the channels’’. The intersection concept suggests SCM is not the union of logistics, marketing, operations management, purchasing and other functional areas. Rather, it includes strategic, integrative elements from all of these disciplines. For instance, in the purchasing area, negotiating a long-term arrangement is a strategic element and transmitting a purchase order is tactical. The supply chain manager would be involved in the negotiations, but not the purchase order transmission. Similarly, in the logistics area, hiring a third- party logistics (3PL) provider is a strategic decision, while picking and packing in the warehouse are tactical. At the intersection, SCM coordinates cross-functional efforts across multiple firms. SCM is strategic, not tactical. In practice, inter-sectionist organizations may appoint a supply chain council, consisting of key executives across functions (e.g. logistics, marketing and purchasing) and institutions (e.g . manufacturer, retailer and 3PL). The council would break down barriers to SCM and seek opportunities to apply SCM concepts to improve overall supply chain performance. A small, consultative SCM group, operating in a staff (rather than a line) capacity, would also be indicative of the inter-sectionist perspective. Logistics, marketing, operations and purchasing do not report to SCM. Rather, these departments draw on the SCM group for research, intelligence and consulting support.

Despite a growing base of literature and experience, there appears to be no consensus on the relation between logistics and SCM. Cooper et al. (1997) recognize multiple perspectives on logistics versus SCM, nothing ‘‘practitioners and educators have variously addressed the concept of SCM as an extension of logistics, the same as logistics, or as an all- encompassing approach to business integration’’. They also suggest that SCM ‘‘can be the management of all business processes’’.

In recent years, the area of SCM has become very popular. This is evidenced by marked increases in practitioner and academic publications, conferences, professional development programs and university courses in the area. While interest in SCM is immense, it is clear that much of the knowledge about SCM resides in narrow functional silos such as purchasing, logistics, IT and marketing. This growing area of knowledge needs more attention; first of all, there isn’t any manuscript considering the new eras of this discipline; in addition, most of the existent texts concentrate on the missing theoretical aspects and empirical evidences. This chapter introduces logistics and SCM and contains some primary definitions about these two concepts.

3. Conclusion

a. There are four conceptual perspectives on SCM versus logistics: traditionalist, relabeling, unionist and inter-sectionist.
b. The traditionalist postions SCM with in logistcs, i.e. SCM is one small part of logistics.
c. The relabelling perspective simply renames logistics; what was logistics is now SCM.
d. The unionist perspective treats logistics as a part of SCM ; SCM completely subsumes logistics.
e. The intersection concept suggests SCM is not the union of logistics, marketing, operations management, purchasing and other functional areas. Rather, it includes strategic, integrative elements from all of these disciplines.

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Chapter 3: Global and Domestics Supply Chain Management

Objectives

- Understand the issues of global supply chain
- Identify the differences between global and domestics supply chain

1. Introduction

Nowadays with globalization, global supply chain management is becoming a very important issue for most of businesses. The main reasons of this trend are procurement cost reduction, purchasing risks control, revenues increasing and, etc. For instance, companies may set up overseas factories to benefit from tariff and trade concessions, lower labor cost, capital subsidies, and reduced logistics costs in foreign markets. Moreover, easy access to abroad markets and close proximity to customers result better organizational learning. On the other hand, improved reliability can be obtained as a consequence of closer relationship with suppliers. There are some issues that should be considered in managing a global supply chain. First of all, the company should decide about its general outsourcing plan. For whatever reason, businesses may prefer to keep some aspects of supply chain nearer to home (Farahani et al, 2009).

The second issue that must be incorporated into a global supply chain management strategy is supplier selection. It can be very difficult to comparing bids from a range of global suppliers. Companies usually jump on the lowest price instead of taking time to consider all of the other elements. On the other hand, selecting the right suppliers is influenced by a variety of factors, and thus there will be additional complexity in supplier selection due to the multi-criteria nature of this decision (Farahani et al, 2009).

Additionally, companies must make decisions about the number of suppliers to use. Fewer supplies may result reduced inventory costs, volume consolidation and quantity discounts, reduced logistical costs,coordinated replenishment,

improved buyer–supplier product design relationship, and thus better customer service and market penetration. However, small number of suppliers could lead to potential problems if one vendor is unable to deliver as expected, especially in global sourcing strategy. Finally, companies who prefer to ship their manufacturing overseas may face some additional concerns. Questions about the number of plants as well as their locations can pose complex logistical problems (Farahani et al, 2009).

2. Global Vs. Domestic Supply Chains

There are many differences between global and local SCs, where the global SCs are generally more advanced and complex. However, it does not necessarily mean that the global supply chains are always the best solution. Nowadays you can find few sole domestic companies. Global sourcing is becoming a critical strategy for most of businesses or at least for their suppliers. Fewer and fewer companies are still selling their merchandises merely in domestic markets. Even if a company wants to stay totally domestic, competitors will come from every area of the world to its market. If domestic suppliers and customers are the only partners of a company, it needs to be analyzed whether it would be better to develop a global SC or not. Although extension of companies to global marketplaces is a strategy almost accepted by everyone, the way it should be translated when it comes to managing global SCs is not that much clear. On the other hand, can the domestic features of a locally managed supply chain be easily considered as a part of a larger global supply chain? Before answering this question, we need to know the differences between the global and domestic SCs.

3. Differences Between Global and Domestic Supply Chains

Obviously, one of the main dissimilarities between global and domestic supply chain management is that the former involves company's worldwide suppliers and interests rather than just a local or national direction. Thus, global supply chains are more difficult to manage than domestic supply chains. Large

geographical distances in global context not only increase transportation costs, but also complicate other logistics decisions because of inventory cost tradeoffs due to increased lead time in the supply chain. Dissimilar local cultures, languages, laws and currencies lessen the effectiveness of supply chain processes such as demand forecasting, material planning, supplier relationship management, etc. Moreover, shortages of infrastructural resources especially in developing countries may hinder supply chain's operations. Lack of qualified personals, bureaucratic management, poor banking system, inadequate road network, system inflexibility, inability of suppliers to provide requestedproducts in adequate quality and quantity, and deficiencies in logistics and telecommunications infrastructure are just some problems frequently encountered when operating on the global scale. There are some elements that are required to manage any supply chain regardless of whether it is domestic or global. Visibility and flexibility are some of basic ingredients that need to be incorporated in order for a supply chain to function efficiently regardless of the length of the chain.

Visibility is a key element. Effective supply chain collaboration requires that the people be able to see accurate and timely data showing needed information at different stages in the supply chain. This is critical in order to allow companies to manage their supply chain strategically, identifying various points throughout the supply chain where goods can be held to reduce the risk of delays. The increased visibility makes it possible to operate supply chains more efficiently leading to lower costs.

Another element is flexibility, a critical factor to the success of the supply chain. Importance of flexibility in supply chains and logistics becomes so obvious when we understand that global supply chain works in a vague environment where markets and customers are dynamic. In the new millennium, time is becoming the strongest competitive tool for the supply chain managers. As the basis of competition expands to the supply chain and time becomes increasingly significant, an important issue will be the flexibility of the supply chain. A

supply chain should then have enough flexibility in order to be able to compete efficiently.

4. Characteristics of Global Supply Chains

There are a number of characteristics, which add more difficulties to handling a global supply chain compared to a domestic. More important ones are: geographics distances, forecasting complexities, economical and political worries, and infrastructural insufficiency.

- **Geographic Distances**

No need to say, worldwide business are associated with larger geographic distances and more unpredictable disturbances, implying longer lead times. Longer lead times in a supply chain cause "the bullwhip effect". The bullwhip effect is a dynamic in supply chains. This phenomenon happens when small changes in product demand by the consumer is translated into wider swings in demand experienced by companies, going back in the supply chain. As a result, companies at different stages in the supply chain will have different pictures of final-customer's demand, and a breakdown in supply chain coordination will occur.

- **Forecasting Complexities**

Another feature of global supply chains that increases the bullwhip effect is forecasting inaccuracy. Increased geographical distances and communication difficulties result in forecasting complexities. Moreover, in a global SC, different cultures with different languages and mentalities should be included into the demand forecasting models. As the exactitude of demand forecast has considerable impact on the safety stock level, operating in the global context tends to raise inventories. On the other hand, demand forecasting based on orders received instead of end user demand data will become more and more inexact as it moves up the supply chain. In global supply chains, companies are usually removed from contact with the end user, and thus they lose touch with actual market demand. Therefore, each company just sees the orders that come to it, and when it uses this order data to do demand forecasts, it adds more

distortion to the demand picture and passes this distortion along in the form of orders that it places with its suppliers.

- **Economical and Political Worries**

Global SCs carry unique risks, including variability and doubt in currency exchange rates, economic and political instability, tariffs and duties changeability, non-tariff trade barriers, individual income tax, etc. Although macroeconomic uncertainties arise in the national setting, in the international context, the problem is magnified as the company deals with a number of national macroeconomic settings. Since then, risk management has to be seen as an essential part of global SCM, where practitioners should factor these risks intotheir decisions when dealing with global supply chains. For example, currency exchange rate affects the price of goods purchased in the supplier's currency, and so influences the financial performance of the supply chain. Thus, its changes should be traced in order to continuously make decisions about the time and quantity of purchasing.

- **Infrastructural Insufficiency**

Infrastructural shortages in developing countries in transportation and telecommunications as well as inadequate worker skills, supplier availability, supplier quality, equipment and technology provide challenges normally not experienced in developed countries. These difficulties reduce the degree to which a global supply chain provides a competitive advantage. For example, intra-country links are usually sparse in the third world countries, making access to new inland markets more difficult and costly.

- **Global Sourcing**

One of the most important activities of global SCM is global sourcing. Global sourcing occurs when buyers purchase goods and services from sellers located anywhere in the world. Global sourcing is used as a proactive strategy to reap economic advantage. As developing countries continue to implement free market reforms, educate workforces and develop expertise and knowledge, these emerging economies can be considered as a cost-effective alternative compared to more expensive, domestic resources. Global sourcing is a sourcing

strategy which involves identifying, assessment and negotiating supply across multiple countries in order to minimize costs, make the most of performance and lessen related risks. Global sourcing related factors that must be controlled can be summarized as follows (Minahan 2003):

a. Material costs.Price, tooling, transaction, and other costs related to the actual product or service delivered.

b. Transportation costs.Transportation, freight charge, consolidation, transfer fee, pickup and delivery.

c. Inventory holding costs.Warehousing, taxes, insurance, depreciation, shrinkage, obsolescence, and other costs associated with maintaining inventories, including the cost of money or opportunity costs.

d. Cross-border taxes, tariffs, and duty costs.The sum of duties, shipping, insurance and other fees and taxes for door-to-door delivery. –Supply and operational performance.The cost of noncompliance or underperformance, which, if not managed properly, can offset any price variance gains attained by shifting to an offshore source.

e. Supply and operational risks.including geopolitical factors, such as changes in country leadership; tariff and policy changes; and instability caused by war and/or terrorism or natural disasters (e.g., typhoons, earthquakes) all of which may disrupt supply lines. Such variables give global sourcing attributes that are similar to financial and risk management, requiring companies to determine performance targets and to develop a balanced supply portfolio that includes the appropriate mix of cost, risk and performance.

SCM has inspired a new Council of Logistics Management (CLM) definition of logistics as ‘‘that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet

5. Conclusion

a. The global SCs are generally more advanced and complex.

b. One of the main dissimilarities between global and domestic supply chain management is that the former involves company's worldwide suppliers and interests rather than just a local or national direction.

c. Visibility and flexibility are some of basic ingredients that need to be incorporated in order for a supply chain to function efficiently regardless of the length of the chain.

d. There are a number of characteristics global supply chain. More important ones are: geographics distances, forecasting complexities, economical and political worries, and infrastructural insufficiency

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Chapter 4: Key Issues in Logistics and Supply Chain Management

Objectives

- Understand many issues in Logistics and Supply chain
- Identify the basic challenges in Logistics and Supply Chain

1. Introduction

In chapter 1, we already discussed the evolution of LSCM from the fragmentation era, evolving integration, current integration and total integration in 1960, 1980, 1990 and 2000 respectively. Decision in one functional area will impact various performance of all others.

In this section we introduce some of the supply chain management issues as explained in the following sections.

2. Demand Management.

A Supply Chain (SC) includes all the participants and processes involved in the satisfaction of customer demand: transportation, storages, retailers, wholesalers, distributors and factories. A large number of participants, a variety of relations and processes, dynamics, the uncertainty and stochastic in material and information flow, and numerous managerial positions prove that Supply Chains should be considered as a complex system in which coordination is one of the key elements of management (Lee et al, 1997).

Very important Supply Chain processes are ordering and delivery of purchased amounts. These are multiple entangled and their disorder can lead to various unwanted effects. One of them is the so-called Bullwhip Effect in which fluctuations in orders increase as they move up the chain. The Bullwhip Effect is a phenomenon that occurs in supply chain management when consumers overbuy, regardless of their needs.

In a supply chain for a typical consumer product, even when consumer sales do not seem to vary much, there is pronounced variability in the retailers' orders to the wholesalers (see Figure 4-1). Orders to the manufacturer and to the manufacturers' supplier spike even more. To solve the problem of distorted information, companies need to first understand what creates the bullwhip effect so they can counteract it. Innovative companies in different industries have found that they can control the bullwhip effect and improve their supply chain performance by coordinating information and planning along the supply chain.

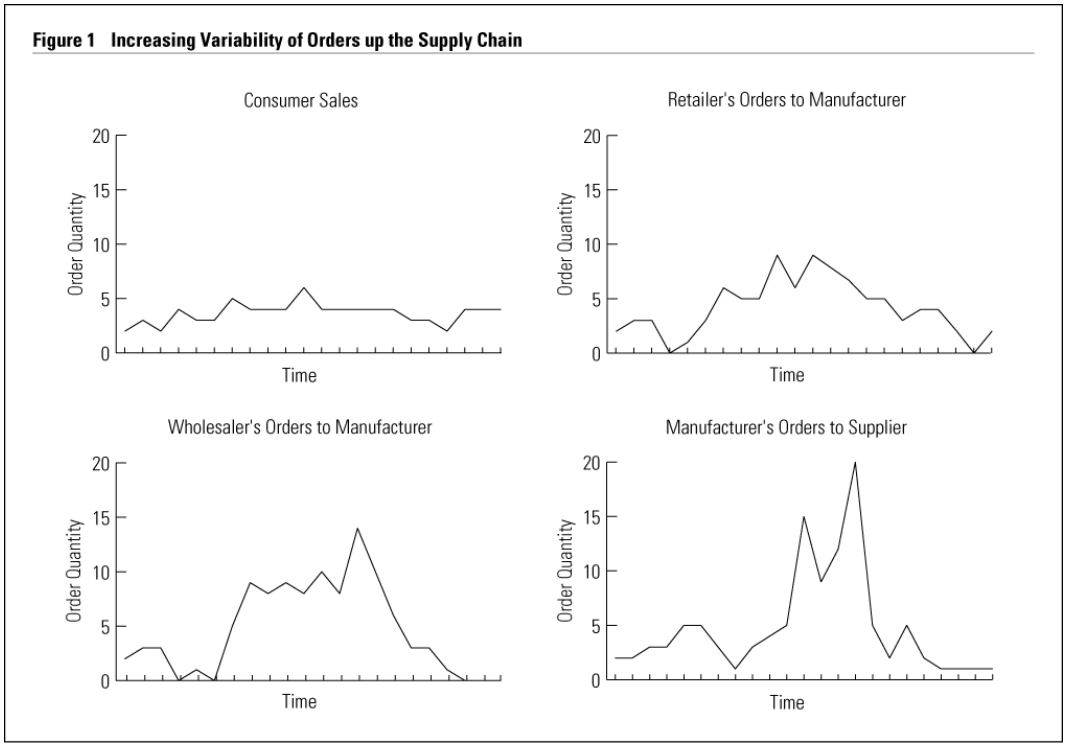

Figure 2-1: Bullwhip Effect

Source: Lee et al, (1997)

Understanding the causes of the bullwhip effect can help managers find strategies to mitigate it. Indeed, many companies have begun to implement innovative programs that partially address the effect. With information sharing, demand information at a downstream site is transmitted upstream in a timely fashion. Channel alignment is the coordination of pricing, transportation, inventory planning, and ownership between the upstream and downstream sites in a supply chain. Operational efficiency refers to activities that improve

performance, such as reduced costs and lead time. We use this topology to discuss ways to control the bull-whip effect (see Table 4-1)

Table 4-1: A Framework for Supply Chain Coordination Initiatives

Causes of Bullwhip	Information Sharing	Channel Alignment	Operational Efficiency
Demand Forecast Update	• Understanding system dynamics • Use point-of-sale (POS) data • Electronic data interchange (EDI) • Internet • Computer-assisted ordering (CAO)	• Vendor-managed inventory (VMI) • Discount for information sharing • Consumer direct	• Lead-time reduction • Echelon-based inventory control
Order Batching	• EDI • Internet ordering	• Discount for truck-load assortment • Delivery appointments • Consolidation • Logistics outsourcing	• Reduction in fixed cost of ordering by EDI or electronic commerce • CAO
Price Fluctuations		• Continuous replenishment program (CRP) • Everyday low cost (EDLC)	• Everyday low price (EDLP) • Activity-based costing (ABC)
Shortage Gaming	• Sharing sales, capacity, and inventory data	• Allocation based on past sales	

Source : Lee et al, (1997)

3. Inventory Control.

Consider a retailer that maintains an inventory of a particular product. Since customer demand changes over time, the retailer can use only historical data to predict demand. How should the retailer manage inventory? More fundamentally, why should the retailer hold inventory in the first place? Is it due to uncertainty in customer demand, uncertainty in the supply process, or some other reasons? If it is due to uncertainty in customer demand, is there anything that can be done to reduce it?

The term inventory can be defined as the quantity of goods that is available on hand or in stock. There are three main formats of inventory: raw material, work in progress and finished goods. These depict the different product stages on a continuum from product supply to customer demand. In order to understand the role of inventory in the supply chain it may be sensible to ask the question: Why hold inventory? There may be several answers (see Figure 4-2).

Figure 4-2: Reasons for holding inventory

Source : Scott et al (2011)

4. Distribution Strategies.

Typically, three distinct outbound distribution strategies are used as illustrated in Figure 4-3:

a. Direct shipment. In this strategy, items are shipped directly from the supplier to the retail stores without going through distribution centers.

b. Warehousing. This is the classic strategy in which warehouses keep stock and provide customers with items as required.

c. Cross-docking. In this strategy, items are distributed continuously from suppliers through warehouses to customers.

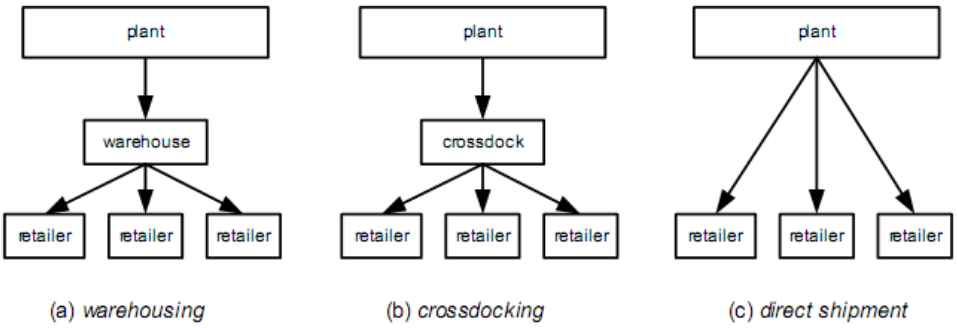

Figure 4-3: Distribution Stategies

Source : Simchi-Levi et al (2000)

Table 4-2 summarizes and compares the three distribution strategies discussed in this section. The inventory-at-warehouses strategy refers to the classic distribution strategy in which inventory is kept at the warehouses. The allocation row in the table refers to the point at which the allocation of different products to different retail outlets needs to be made. Clearly, in direct shipment, allocation decisions have to be made earlier than they do when cross-docking or warehousing strategies are employed, so forecast horizons need to be longer.

Table 4-2: Comparation of distribution strategies

Strategy → Attribute ↓	Direct Shipment	Cross-Docking	Inventory at Warehouses
Risk pooling			Take advantage
Transportation costs		Reduced inbound costs	Reduced inbound costs
Holding costs	No warehouse costs	No holding costs	
Allocation		Delayed	Delayed

Source : Simchi-Levi et al (2004)

The distribution strategies need to correspond with the cost and the required service level to meet the customers' needs. There are numerous factors to be

considered before deciding on the number of facilities and extent of centralization of the distribution network, for the efficiency in logistics and distribution of goods at the minimum operating costs, including capital investment and time, whilst being able to maintain good service quality for the customers (Figures 4-4 and 4-5).

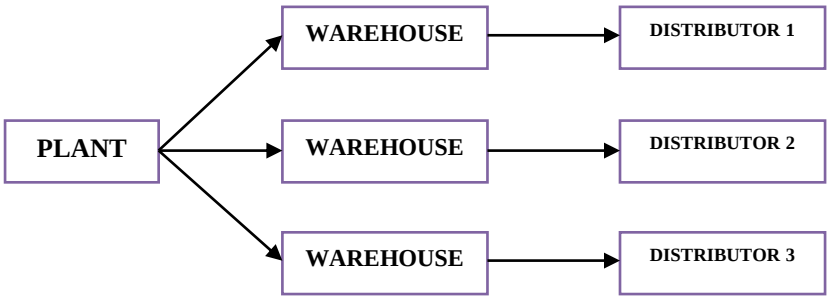

Figure 4-4: Decentralized

Source : Simchi-Levi et al (2000)

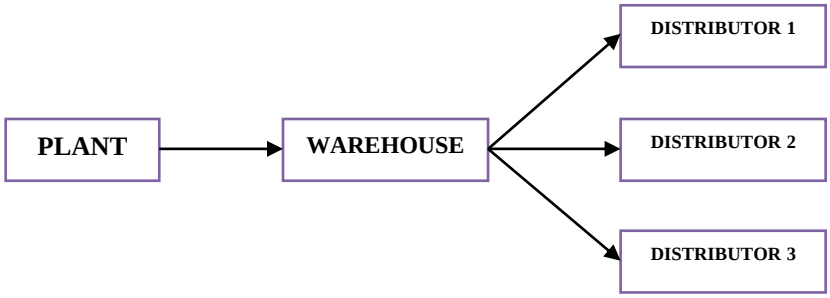

Figure 4-5: Centralized

Source : Simchi-Levi et al (2000)

Table 4-3. below show the difference between decentralized and centralized strategy

Table 4-3: Difference Between Decentralized And Centralized Strategy

Strategy	Advantages	Disadvantages
Decentralized	- Ability to respond well to customers' needs, and to provide good	- Higher operating costs, e.g. administrative costs, warehouses rents,

	support to sales and marketing activities. - Low risk in the event that one of the warehouses is temporarily inaccessible or damage, e.g. by flood, fire, natural disaster, etc., as there are other facilities for continuing the operations	remuneration, transport, and costs of other equipment. - Higher total inventory costs as each warehouse is required to stock a certain level of inventory
Centralized	- Transport facilities trend to be efficient and optimally used, as routing and scheduling becomes simpler. - Reducing the operating costs, e.g. administrative cost, remuneration, cost of other equipment, etc. - Efficient inventory control	- Operating limitation in responding to customers' needs, e.g. reduced ability to support the sales and marketing's promotional campaigns during special occasions - Potential risk in case the warehouse is temporarily inaccessible or damage, e.g. by flood, fire, natural disaster, etc

Source : Simchi-Levi et al (2004)

There exist several alternative distribution channels that can be used separately or in combination with each other to bring a product or group of products to the end user. Distribution channels contain different numbers of intermediary levels that are referred to as the length of those channels. Each member of a distribution channel that has an impact on transferring the product and its ownership to the ultimate user is considered to be a channel level. Therefore, both the producer and the consumer are members of every distribution channel. Figure 4-6 shows the main alternative channels of distribution. The physical transference of products between channel members is illustrated by the hand-shaped icons in the figure.

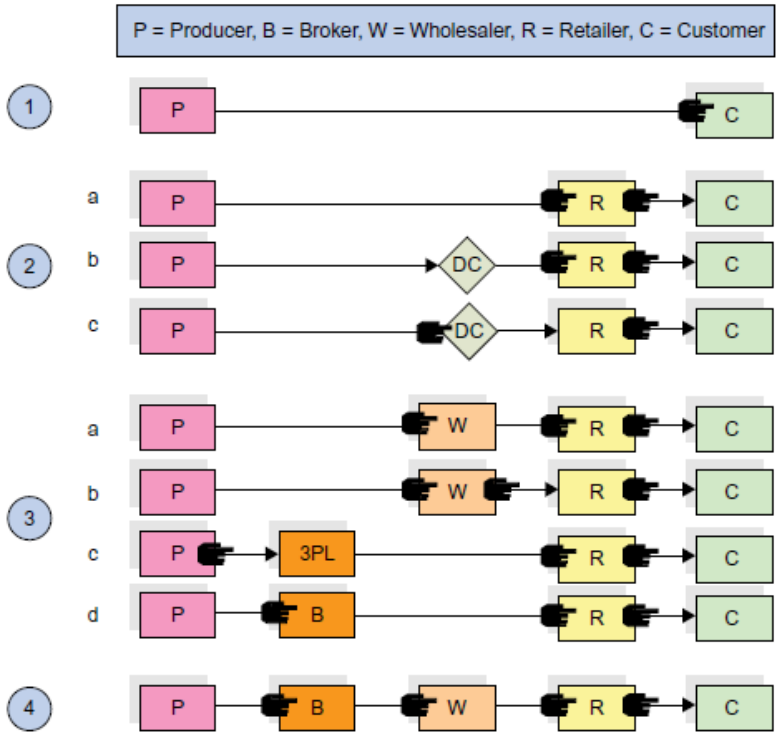

Figure 4-6: Alternative Distribution Channel

Source : Farahani et al, (2011)

In today's distribution environment, the pressure is on to make the operations more efficient. Companies are cutting costs by reducing inventory at every step of the operation, including distribution. Customers are demanding better services, which translate into more accurate and timely shipments. One innovative ware-housing strategy that has great potential for controlling the logistics and distribution costs while simultaneously enhancing the level of customer service is cross docking (Apte and Viswanathan, 2000).

Cross docking is a material handling and distribution concept in which items move directly from receiving dock to shipping dock, without being stored in a warehouse or distribution center. In a typical cross docking system, the primary objective is to eliminate storage and excessive material handling.

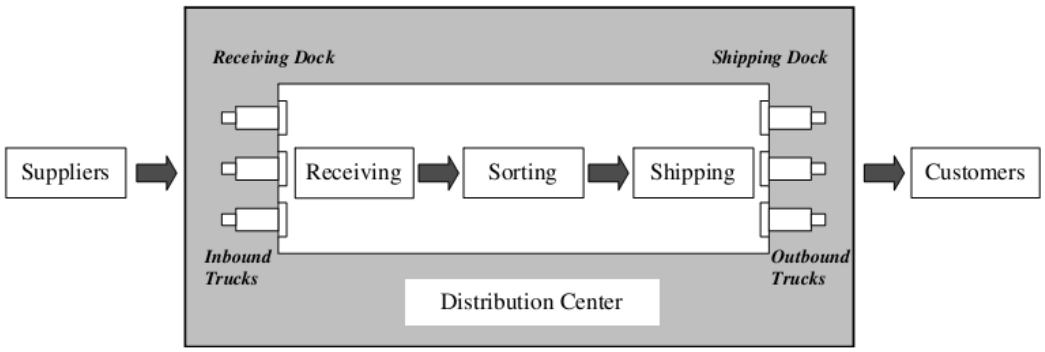

Figure 4-7: Typical Flow in a Cross docking system

Source : Yu a and Egbelu (2008)

Figure 4-7 shows the flow of materials in a typical cross docking operation. As shown in the figure, the cross docking system generally operates as follows:

1. Products (packages, boxes, cartons, etc.) arrive at the distribution center and are scanned and verified at the receiving docks. In some cross docking systems products are also weighed, sized and labeled at the receiving dock.
2. Products are placed on the sortation systems, which sort by destinations.
3. Products are processed to the proper location on the shipping docks and leave the distribution center.

4. Supply Chain Alliances

What are strategic supply chain alliances and partnerships? Unfortunately, no standard definition of these concepts is available. The terms partnering, joint venture, alliance, cooperative agreement, collaborative relationship, and inter-organizational partnership are often used interchangeably to describe contemporary efforts at cooperation among organizations. One perspective defines a supplier partner as a firm with whom another firm has an ongoing relationship, involving a commitment over an extended period, and a mutual sharing of the risks and rewards of the relationship (Blancero and Ellram, 1997). Another view is that a strategic alliance is a relationship between firms in which the parties cooperate to produce more value (or a lower cost) than is possible in

a market transaction (Lewis, 1995). Finally, the definition endorsed in this chapter views strategic alliances or partnerships as

Alliances or partnerships may also satisfy a basic need or requirement to improve supplier relations or promote supply chain cooperation and effectiveness. Others rely on alliances or partnerships to gain access to critical technology, often before the technology is available to the marketplace. Whatever the reasons for pursuing collaborative agreements, the parties to an alliance or partnership should has one primary objective when crafting an agreement: to beat the market.

Alliances and partnerships differ widely in their scope and effectiveness. Having collaborative agreements is not a yes or no proposition—yes, these agreements are in place, or no, they are not. One agreement or relationship may be basic, while another is strategic or advanced. Furthermore, an alliance may start as basic or general in its focus but evolve over time to create new and exciting opportunities for the participants. Whatever the reason for the alliance or partnership, certain features differentiate more advanced (i.e., strategic) agreements from less advanced agreements. Table 4-4 summarizes these differentiating characteristics.

5. Procurement Strategies

Traditionally, procurement has focused on reducing costs. However, the evolution from focusing on item cost to analyzing total cost of ownership and supply chain optimization indicates that the next logical step is to identify ways in which procurement can enhance revenue. Procurement does have the potential to impact revenue in-flows by affecting both the price and the volume of finished goods. From a price standpoint, carefully cultivating supplier partnerships can improve revenue streams from the finished goods if the partnerships result in securing enhanced raw materials.

Table 4-4. Alliance and Partnership Characteristic

Alliance and Partnership Characteristics

BASIC

- Minimal use of cross-functional/cross-locational teams
- Less structured development process
- Focus on risk and cost reduction
- Limited to functional executive involvement
- Measure success by purchase price reduction
- Minimal linkage to business or functional goals
- Low organizational visibility

MODERATELY ADVANCED

- General reasons for entering alliance or partnership
- Direct linkage to functional goals
- Development follows a structured process
- Cross-functional/cross-locational teams manage the process
- Strives for performance gains in cost, quality, delivery, and cycle time

ADVANCED

- Alliance or partnership supports strategic business needs
- Features exchange of key personnel
- Relationship has high executive visibility and contact
- Often focuses on technology development
- Strategic performance measures used to evaluate success—new markets entered, new technology developed
- Extensive use of cross-functional/cross-locational teams

Source : Cavinato and Kauffman (2000)

Typical enhancements include improving the quality and performance of the finished good, enhancing the attractiveness or features of the finished good, and increasing the level of customer service support. From the volume-improvement side, suppliers can be prime drivers of improvements in fill rate (availability), capacity, and manufacturing yield, for example (See Figure 4-8). Although revenue enhancement is possible, it will require operational changes: specifically, more extensive supply chain interaction with functional areas such as new product development and manufacturing operations. The level of

interaction required extends beyond periodic meetings to actual collaboration on the processes themselves over an extended period of time. In addition, traditional cost-modeling equations will probably need refining to reflect the new emphasis on revenue enhancement.

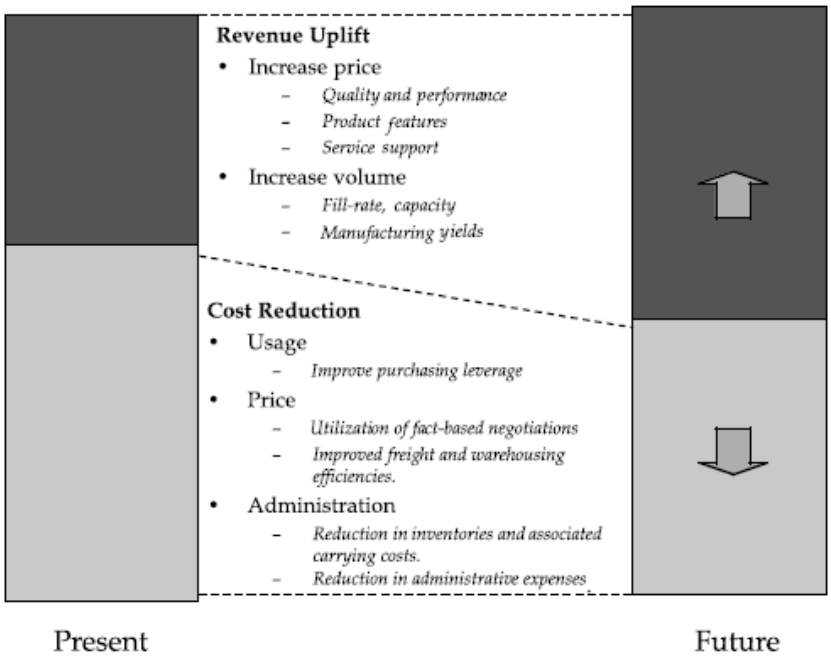

Figure 4-8: Procurement Improvement

Source: Cavinato and Kauffman (2000)

6. Product Design.

Effective design plays several critical roles in the supply chain. Most obviously, certain product designs may increase inventory holding or transportation costs relative to other designs, whereas other designs may facilitate a shorter manufacturing lead time. Unfortunately, product redesign is often expensive. When is it worthwhile to redesign products so as to reduce logistics costs or supply chain lead times? Is it possible to leverage product design to compensate for uncertainty in customer demand? Can one quantify the amount of savings resulting from such a strategy? What changes should be made in the supply chain to take advantage of the new product design? Finally, new concepts such

as mass customization are increasingly popular. What role does supply chain management play in the successful implementation of these concepts?

7. Information Technology and Decision-Support Systems

Information technology (IT) is a critical enabler of effective supply chain management. Indeed, much of the current interest in supply chain management is motivated by the opportunities that appeared due to the abundance of data and the savings that can be achieved by sophisticated analysis of these data. The primary goal of IT in the supply chain is to link the point of production seamlessly with the point of delivery or purchase. The idea is to have an information trail that follows the product's physical trail. This allows planning, tracking, and estimating lead times based on real data. Any party that has an interest in the whereabouts of the product should be able to have access to this information. As we can see in Figure 4-9, products flow from the supplier to the manufacturer, internally through the manufacturer's distribution system, and then on to the retailers.

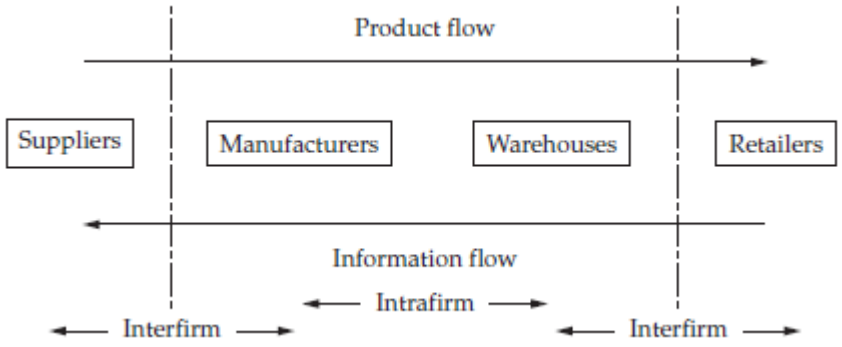

Figure 4-9: Flow of information and goods in the supply chain

Source : Simchi-Levi et al (2004)

Gunasekaran and Ngai (2004) developed an information system framework in SCM perspective as illustrated in Figure 4-10.

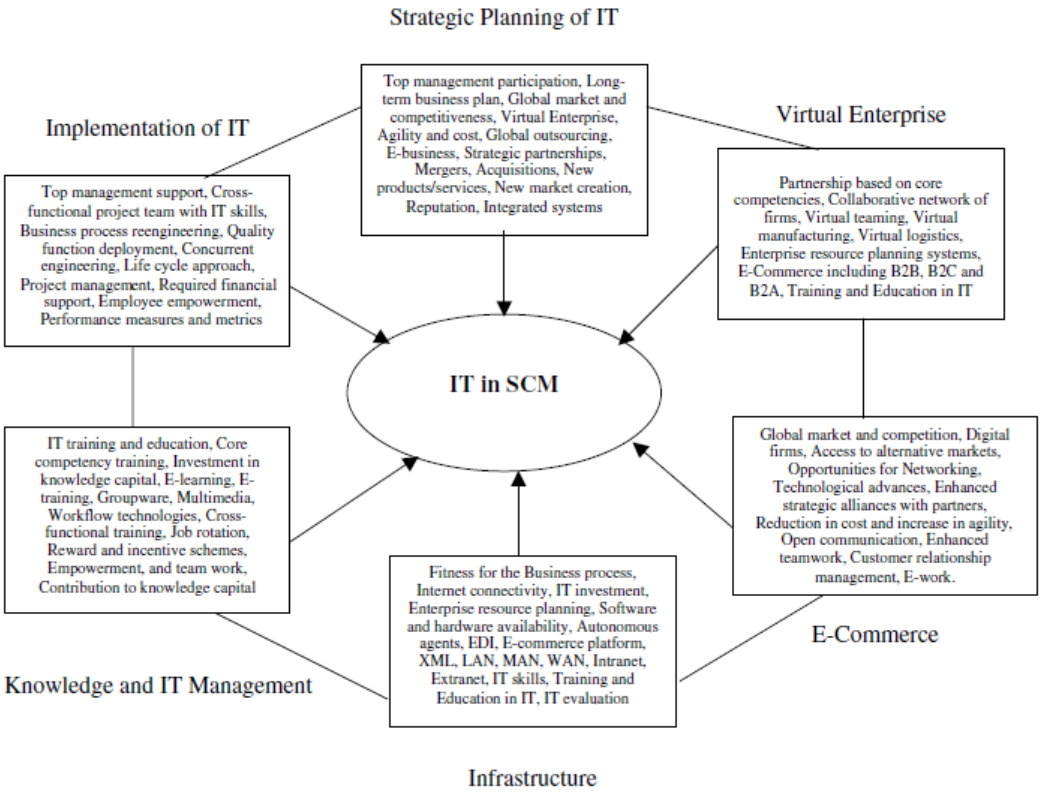

Figure 4-10: A framework for the development of IT for effective SCM.

Source : Gunasekaran and Ngai (2004)

A supply chain is the system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. It includes the flows of materials, information, and finances. More and more companies are demanding the track and trace of items and products in their supply chains as it can improve supply chain visibility and efficiency. Track and trace in supply chain can also help prevent counterfeit and theft of products and enhance security. Track and trace in supply chain requires identification of items, capture of events as the items move through supply chain and query of events for the visibility of the items.

Distribution is a complex process based on intelligent systems for sorting, planning, routing, and consolidation that supports faster transportation, different transportation modes, fallback scenarios in case of failures, value added services such as time sensitive deliveries and tracing of products throughout the supply

chain or transport network. Many large logistics companies have developed solutions for delivering these services in order to meet the requirements of their customers and to improve their services. Smaller companies, however, cannot afford these investments and are mainly active in the 'old' point-to-point transportation market, or co-operate with the larger companies, using their respective systems.

The companies that have the necessary information systems in place to participate in the market for high-end transport solutions normally offer their customers methods for tracking and tracing their consignments. Even though many customers would benefit from using this information in their own information systems, only few of them are doing this today because of the large investments in their systems required to adapt to the proprietary interfaces of the transport companies. However, these systems typically have two major drawbacks:

- They do not normally work across company boundaries.
- They do not provide accurate 'life' information about location and, particularly, the status of individual units or items.

That is, continuous information about the current position or status of transport goods (in the sense that the geographic position can be queried at any time) at item level is not commonly available today. Typically, this information is provided – if at all – at a vehicle or container level only. Existing solutions are typically based on scanning bar codes at process or control points. Furthermore, very few companies have true global or even European coverage. In daily business, products are frequently shipped by subcontractors of the transport company, which frequently means that tracking and tracing is no longer possible. Only in a few cases do carriers exchange tracing information, but in most cases the costs for adapting the proprietary systems to each other are prohibitive. Figure 4-11 shows tracking and tracing scheme.

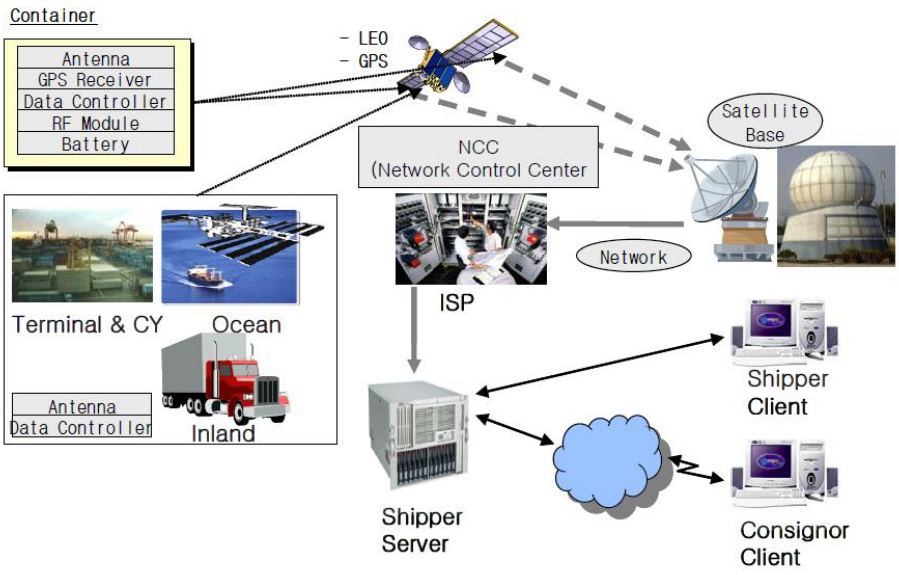

Figure 4-11: Container Tracking And Tracing System

Source : Ahn (2005)

8. Multimoda

For the external transport of material, goods and consignments between the stations of a supply chain network, the following transport modes are available:

- road
- rail way
- inland waterway
- seaway
- airspace

For the individual case, generally only one, two or three of them are relevant. In addition to the transport modes, liquids and gases, even solids, parcels, can be transported through pipelines. Bulk goods and general cargo are also conveyed with cable cars or by belt conveyors. However, pipelines, cable cars and belt conveyors are only efficient for a continuous material flow, which lasts for many years. Sections with the same transport mode can be connected by intermediate stations to intra-modal transport chains. Different transport modes

are combined as shown in Figure 4-12 to multimoda transport chains or freight chains.

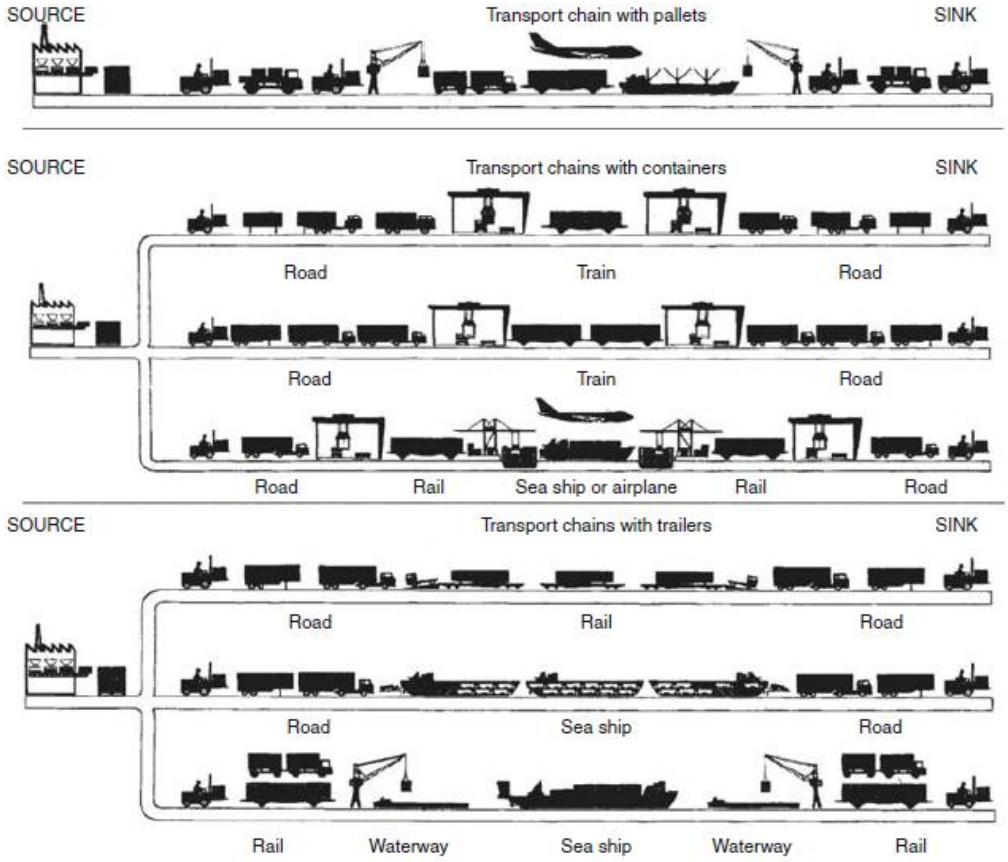

Figure 4-12: Multimoda Transport

Source : Gudehus and Kotzab (2009)

The development of multimodal transport requires transport links, nodes, and services. The development of dry ports, an important component of intermodal transport, could play a major role in promoting intermodal transport in Asia, including its twelve landlocked countries. Dry ports located in deep inland areas, as opposed to near the sea, would incorporate customs and other related facilities and rail links, as well as provide for transfer, transshipment, and distribution functions for cargo. By encouraging a modal shift, such dry ports would help to ease road traffic congestion and reduce emissions. The volume of international trade and freight transport in Asia has witnessed fast growth in recent decades. The resulting environmental impact of freight transport

operations has become a major cause of concern. Intermodal transport has gained prominence recently due to its potential to offer door-to-door service through the integration of various modes of transport in the logistics chain, improved coordination and services, and the development of intermodal interfaces (Hanaoka and Regmi, 2011)

As maritime containerized transport continues to increase, functional seaport inland access is important for the efficiency of the transportation chain as a whole. Inland intermodal terminals are important nodes in the transport network and have attracted considerable attention. The dry port concept is based on a seaport directly connected by rail with inland intermodal terminals where shippers can leave and/or collect their goods in intermodal loading units as if directly at the seaport (Woxenius et al., 2004). Services such as storage, consolidation, depot, maintenance of containers, track and trace, customs clearance, etc. should be available at the dry port. The quality of the access to a dry port and the quality of the road–rail interface determines the dry port's performance. Scheduled and reliable high capacity transportation to and from the seaport is therefore necessary. Thus, dry ports are used much more consciously than conventional inland terminals, with the aim of improving the situation resulting from increased container flows, and a focus on security and control by the use of information and communication systems. The dry port extends the gates of the seaport inland, with shippers viewing the dry port as an interface to the seaport and shipping lines. Conventional hinterland transport is based on numerous links by road and only a few by rail, which is generally limited to serving major conurbations at relatively large distances from the seaport, as shown in Figure 16a. Dry ports are divided into close, mid-range and distant dry ports (Woxenius et al., 2004). A seaport and all three types of dry port are presented in Figures 4-13a and 4-13b.

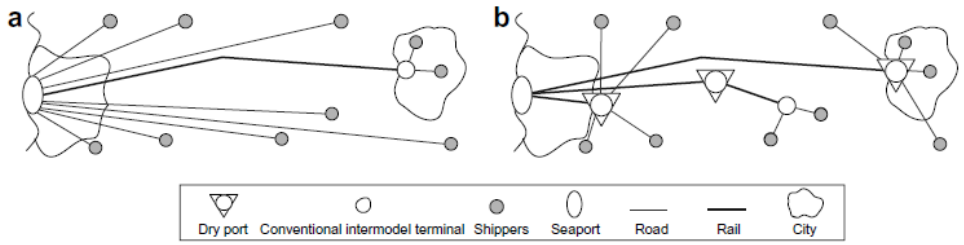

Figure 4-13: (a) Convenional hinterland transport and (b) implemented dry **port concept (close, mid-range and distant)**

Source : Roso (2007)

The figures show that implementation of a dry port reduces the number of transportation links from/to the seaport. Implementation of a dry port in a seaport's immediate hinterland increases seaport's terminal capacity and with it comes the potential to increase productivity since bigger container ships will be able to call at the seaport. With dry port implementation seaport's congestion from numerous lorries is avoided because one train can substitute some 35 lorries in Europe. With reduced number of lorries on the roads congestion, accidents, road maintenance costs and local pollution are reduced as well. A dry port may also serve as a depot, empty containers storage. Road carriers would lose some market share but in some countries where long trailers are not allowed to pass through cities for safety reasons a dry port implementation is a good solution, if not indispensable, from their perspective as well. The benefits from distant dry ports derive from the modal shift from road to rail, resulting in reduced congestion at the seaport gates and its surroundings as well as reduced external environmental effects along the route. Table 4-5 summarizes some characteristics of dry ports related to their development and operation. All dry ports included in the case studies were evaluated in terms of modes served; environmental benefits/concerns; potential for modeshift opportunities; ownership; operational arrangements; government policies and incentives for the development of dry ports; and lessons learned from the development and operation of intermodal transport.

Table 4-5: Comparasion of key Features of Selected dry Ports

	Uiwang Republic of Korea	Birgunj Nepal	Lat Krabang Thailand	Alashankou China	Tughlakabad India
Modes served Environmental benefits/concerns, potential for modal shift	Rail, road The use of railway to transport freight to/from ports to ICD contributes to a reduction in road congestion and vehicle emissions.	Rail, road The modal shift to railway for transport between port and ICD, with collection and distribution of cargo by truck, contributes to emission reduction.	Rail, road Contributes to reduced road congestion and vehicle emissions, but the share of rail freight is decreasing due to vehicle queues, ICD congestion and limited railway capacity.	Rail, road Long-haul freight is mainly by rail. Development of dry ports, improvement of railway links and efficiency would contribute to environmental benefits.	Rail, road Transportation to/from ports is mainly by rail, with roads used for collection and distribution. Increasing trend of container handled at ICDs and transport to ports by railways shows overall positive environmental benefits
Ownership	Public–private partnership (PPP)	Government	Public–private partnership	Chinese Railway, CRCTC	CONCOR, a subsidiary of Indian Railway
Operational arrangement	Private	Private (leased)	Private (concession)	Public–private CRCTC	Public
Government policies and incentives	Promotion of PPP projects through PIMAC.	Government investing in facility and has developed other dry ports as well.	Concessions to private sector for development and operation. Considering capacity enhancement.	Operations entrusted to CRCTC, a public–private venture.	CONCOR investing in the modernization of facilities and better efficiency through fleet improvements, dedicated platforms, and the use of ICT for container tracking.
Lessons learned from the development and operation of intermodal transport	Good example of PPP. The role of PIMAC in connecting port and ICD with high-capacity railway can reduce road congestion.	Operation delayed due to delays in concluding rail service agreement with Indian Railways.	Congestion at ICD and limited rail capacity connecting to port.	Government policy in developing railways and dry ports attract a higher share of freight to railways. Capacity enhancement ongoing. Starting double stack freight trains.	Good ICD and railway network. Dedicated freight corridors to enhance efficiency.

Source : Hanaoka and Regmi (2011)

Nowadays with globalization, global supply chain management is becoming a very important issue for most of businesses. The main reasons of this trend are procurement cost reduction, purchasing risks control, revenues increasing and, etc. For instance, companies may set up overseas factories to benefit from tariff and trade concessions,

9. Conclusion

a. Very important Supply Chain processes are ordering and delivery of purchased amounts. These are multiple entangled and their disorder can lead to various unwanted effects. One of them is the so-called Bullwhip Effect in which fluctuations in orders increase as they move up the chain.

b. The term inventory can be defined as the quantity of goods that is available on hand or in stock. There are three main formats of inventory: raw material, work in progress and finished goods.

c. Typically, three distinct outbound distribution strategies are used: Direct shipment, Warehousing, and Cross-docking.

d. Alliances or partnerships is a basic need or requirement to improve supplier relations or promote supply chain cooperation and effectiveness.
e. Procurement does have the potential to impact revenue in-flows by affecting both the price and the volume of finished goods.
f. Effective design plays several critical roles in the supply chain.
g. The primary goal of IT in the supply chain is to link the point of production seamlessly with the point of delivery or purchase.
h. The development of multimodal transport requires transport links, nodes, and services.

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Chapter 5: Performance Measurement and Supply Chain Strategies

Objectives

- Understand the importance of supply chain performance measurement
- Understand the supply chain strategies

1. Introduction

All activities in Logistics and Supply Chain Management should be synchronized and integrated so that the objectives could be achieved successfully. There are some strategies to do so. In order to meet with the most appropriate strategies we should measure first the its performance, evaluate and improve them.

2. Performance Metrics

Traditionally, performance measurement is defined as the process of quantifying effectiveness and efficiency of action. In modern business management, performance measurement assumes a far more significant role that quantification and accounting. Shink and Tuttle (1989) claim that "you cannot manage what you cannot measure. In SCM, performance measurement can facilitate inter-understanding and integration among the supply chain members. Performance measurement requires metrics. Performance metrics should be constructed to encourage performance improvement, effectiveness, efficiency, and appropriate levels of supply chain. The following Table 5-1 shows the common example of performance metrics.

Table 5-1: Common examples of performance metrics

Cost Management	Customer Service	Quality	Productivity	Asset Management
Total cost	Fill rate	Damage frequency	Units shipped per employee	Inventory turns
Cost per unit	Stockouts	Order entry accuracy	Units per labor dollar	Inventory levels, number of days of supply
Cost as a percentage of sales	Shipping errors	Picking/shipping accuracy	Orders per sales representative	Obsolete inventory
Inbound freight	On-time delivery	Document/invoicing accuracy	Comparison to historical standard	Return on net assets
Outbound freight	Back orders	Information availability	Goal programs	Return on investment
Administrative	Cycle time	Information accuracy	Productivity index	Inventory classification (ABC)
Warehouse order processing	Delivery consistency	Number of credit claims	Equipment downtime	Economic value-added (EVA)
Direct labor	Response time to inquiries	Number of customer returns	Order entry productivity	
Comparison of actual versus budget	Response accuracy		Warehouse labor productivity	
Cost trend analysis	Complete orders		Transportation labor productivity	
Direct product profitability	Customer complaints			
Customer segment profitability	Sales force complaints			
Inventory carrying	Overall reliability			
Cost of returned goods	Overall satisfaction			
Cost of damage				
Cost of service failures				
Cost of back order				

Source: Bowersox (2013)

3. Supply Chain Strategies

The first step in devising an effective supply chain strategy is therefore to consider the nature of the demand for the products one's company supplies. Many aspects are important – for example, product life cycle, demand predictability, product variety, and market standards for lead times and service (the percentage of demand filled from instock goods). Fisher (1997) defines two basic products: functional and innovative products . The major differentiating factor is the uncertainty of demand: Functional products (e.g. a classic Coke) show a rather predictable demand pattern and have long product cycles. Innovative products on the other hand show an unpredictable demand, and the life cycle can be as short as a few month.

Is Your Product Functional or Innovative?

Functional products include the staples that people buy in a wide range of retail outlets, such as grocery stores and gas stations. Because such products satisfy basic needs, which don't change much over time, they have stable, predictable demand and long life cycles. But their stability invites competition, which often

leads to low profit margins. To avoid low margins, many companies introduce innovations in fashion or technology to give customers an additional reason to buy their offerings. Fashion apparel and personal computers are obvious examples, but we also see successful product innovation where we least expect it.

Although innovation can enable a company to achieve higher profit margins, the very newness of innovative products makes demand for them unpredictable. In addition, their life cycle is short –usually just a few months – because as imitators erode the competitive advantage that innovative products enjoy, companies are forced to introduce a steady stream of newer innovations. The short life cycles and the great variety typical of these products further increase unpredictability. It may seem strange to lump technology and fashion together, but both types of innovation depend for their success on consumers changing some aspect of their values or lifestyle. For companies to be sure that they are taking the right approach, they first must determine whether their products are functional or innovative (See the Table 5-2).

Staying in the realm of simplicity Fisher also sees two basic types of supply chains or supply chain strategies a company can select (Table 5-3). First there is the Physically Efficient Process, which can supply a specified amount of products at the lowest cost possible. Second there is the Market-Responsive Process, which focusses on quick adaptability towards changing market needs.

The strategic implications become obvious quite quickly. One does not want to match a efficient supply chain with a fast changing market, since this would probably leave the company either with a huge excess inventory or, if too little is produced, with many unsatisfied customers. On the opposite side one should not match a responsive supply chain with a steady market demand. Cost for maintaining this flexibility are potentially too high to maintain a positive product margin. Figure 5-1 shows the matches in a matrix.

Table 5-2: Functional Versus Innovative Products: Differences in Demand

Functional Versus Innovative Products: Differences in Demand

	Functional (Predictable Demand)	**Innovative** (Unpredictable Demand)
Aspects of Demand		
Product life cycle	more than 2 years	3 months to 1 year
Contribution margin*	5% to 20%	20% to 60%
Product variety	low (10 to 20 variants per category)	high (often millions of variants per category)
Average margin of error in the forecast at the time production is committed	10%	40% to 100%
Average stockout rate	1% to 2%	10% to 40%
Average forced end-of-season markdown as percentage of full price	0%	10% to 25%
Lead time required for made-to-order products	6 months to 1 year	1 day to 2 weeks

* The contribution margin equals price minus variable cost divided by price and is expressed as a percentage.

Source : Fisher (1997)

Table 5-3: Physically Efficient Versus Market-Responsive Supply Chains

Physically Efficient Versus Market-Responsive Supply Chains

	Physically Efficient Process	Market-Responsive Process
Primary purpose	supply predictable demand efficiently at the lowest possible cost	respond quickly to unpredictable demand in order to minimize stockouts, forced markdowns, and obsolete inventory
Manufacturing focus	maintain high average utilization rate	deploy excess buffer capacity
Inventory strategy	generate high turns and minimize inventory throughout the chain	deploy significant buffer stocks of parts or finished goods
Lead-time focus	shorten lead time as long as it doesn't increase cost	invest aggressively in ways to reduce lead time
Approach to choosing suppliers	select primarily for cost and quality	select primarily for speed, flexibility, and quality
Product-design strategy	maximize performance and minimize cost	use modular design in order to postpone product differentiation for as long as possible

Source : Fisher (1997).

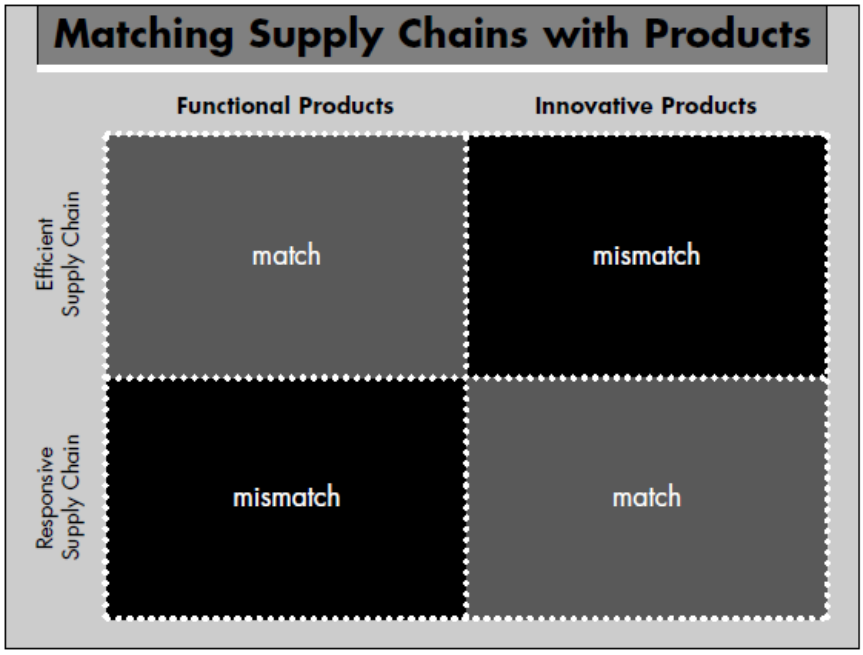

Figure 5-1: Matching Supply Chains with Products

Source : Fisher (1997).

4. Conclusion

a. There are some indicators possibly used to measure and asses the success of supply chain : cost, customer service, quality, productivity, and asset management.

b. There are two basic products: functional and innovative products. The major differentiating factor is the uncertainty of demand: Functional products show a rather predictable demand pattern and have long product cycles. Innovative products on the other hand show an unpredictable demand, and the life cycle can be as short as a few month.

c. There are two basic types of supply chains or supply chain strategies a company can select. First there is the Physically Efficient Process, which can supply a specified amount of products at the lowest cost possible. Second there is the Market-Responsive Process, which focusses on quick adaptability towards changing market needs

References

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