

Advantage of Third Party Logistics in Supply Chain Management

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1. Introduction

Logistics has been called the last frontier that even at the present time, the improvement of logistics has been the primary source of firms to make new profits and maintain competitive advantage. There are also several instances where the logistics system has become the cause of bottlenecks in the firm's overall management. The potential for reducing total cost and for improving the quality of services provided to customers can be increased through the elimination of these bottlenecks. Also, from the social standpoint, an efficient logistics system could offer possibilities to reduce road congestion and environmental pollution, which could result in increased macroscopic economic productivity.

Several innovations have been developed to advance the logistics system. These innovations can be classified broadly into innovations to improve individual processes of logistics, and innovations to improve the logistics system totally. The former includes innovative hardware such as new inter-modal terminals with efficient transshipment ability, and innovative software such as truck route planning with ITS (Intelligent Transport System) and GPS (Global Positioning System). These piecemeal innovations can be developed to their full abilities only when they are employed into improving bottlenecks.

However, it is unlikely that firms merely have one bottleneck in their business processes. Rather, they have many potential bottlenecks, such that eliminating one bottleneck would usually make another one to emerge. This is why we have to control the business process as a system, and have to develop system-management innovations. Among the

innovations which have attracted the people's attention are Supply Chain Management (SCM) and Third Party Logistics (3PL).

This paper will focus on SCM and 3PL, and will examine their relationship. The key questions are as follows: If SCM becomes a common tool, is it beneficial to outsource logistics activities that are sub-functions of the supply chain? If so, how should it be done (in particular, 3PL utilization)? In order to answer them, we will first review the background and purpose of the diffusion of SCM, and show that logistics plays an important part in SCM. We will then outline 3PL and examine its advantages and disadvantages from the viewpoint of logistics performance. After clarifying the relationship of SCM and 3PL, we will indicate that 3PL will also play an important role in SCM, and that SCM and 3PL have positive interactive effects.

2. Development of SCM

2.1 What is SCM?

The supply chain consists of a set of processes associated with the flow of goods, information, and money among firms, from the raw materials supply stage, through production and consumption stage, and finally to the recycling stage. A tool to optimize the supply chain through integrated management is called Supply Chain Management (SCM).

SCM resembles Efficient Customer Response (ECR) and Quick Response (QR) in the sense that these tools aim to efficiently coordinate the firms in the total supply chain in a Just-In-Time (JIT) manner. However, these two tools are targeted for specific industries. ECR is developed for the food processing industry, while QR is for the clothing industry. SCM is not necessarily targeted for any specific industry. All these tools generally aim to maximize total value within the supply chain.

Since SCM involves inter-firm activities, its processes includes various functions such as raw materials supply, production management, transportation, inventory management, information system management, order processing, material handling, and customer management, among others (the simplified term "logistics" will be used in later discussions and is defined as the combination of these functions). Furthermore, the

procedures related to customs clearance are added in the case of international SCM.

One of the main features of SCM is that vertical-process integration from suppliers to customers can be performed through inter-firm strategic alliance. On one side of the pole, there is the case where the whole vertical process is carried by one firm (e.g. former General Motors). As total optimization is superior to the sum of partial optimization in general, total optimization in supply chain is superior to the sum of partial optimization in the individual chain. However, if a firm would enclose all supply chain processes in-house and becomes a large-scale organization, it would bear high administration costs. On the other side of the pole, there is the case where each firm is independent of other firms and transacts individually in vertical process without inter-firm strategic alliance, which makes less optimization benefit and less administration costs. The position of SCM is between these two polar cases. Each independent firm cooperates strategically with other firms in vertical process integration.

2.2 Advantage and disadvantage of SCM

Thus, a well-designed SCM yields positive net value by creating benefit, reducing cost, and improving financial viability (such as profitability.) The firms in the well-designed supply chain could share gains reasonably, resulting in what is called a “win-win” relationship.

First, the sources of creating benefits include lead-time compression or flexible response for customers, which reduce total cost (e.g. inventory cost) from upstream to downstream and enhance service levels for customers. Such improvements can make supply chain firms competitive. These advantages are derived from concentrating firm’s resources to their core-competence and creating value by having flexibility and adaptability against changing market environment.

Second, the cost can also be reduced in relation to the integrated advantage. There is economies of scale and scope in vertical integration of process; for example, avoiding redundant investment in warehousing, and reducing inventory level by information sharing.

However, in order to maximize such net value by SCM, “inter-firm alliance with

reliable partnership” is needed. In practice, making a reliable inter-firm alliance entails high transaction cost, and requires three conditions. First, the period of relationship should be long enough to make good partnership and commitment. Second, the firms in the supply chain should have the necessary abilities and should share reasonable responsibilities (risk sharing). Third, various information, such as ordering, inventory or customer demand, among others, should be shared and processed properly. With regards to the third point, the recent IT development can contribute to SCM.

2.3 SCM and development of IT

In designing how to manage the flow of goods in the supply chain, we always consider the issue of how to process information. Information processing is one of the central functions of SCM. Latest developments and innovations in IT have provided opportunities to increase information processing capabilities, and therefore, to improve the performance of SCM.

IT could make two contributions in the SCM: one is improvement in information sharing among firms, and the other is prompt problem identification and optimization.

First, it is argued that the introduction of Electronic Data Interchange (EDI) is an effective way of promoting prompt information sharing among firms so that it coincides with the objective of SCM. EDI is defined as "connecting computers on-line, and exchanging information on transactions among firms" (Tsuru, 1998). However, a typical EDI needs to introduce a Value Added Network (VAN) or a dedicated line in order to share a network. The large amount of capital needed to invest in a VAN or a dedicated line has been the main reason why the progress of EDI, particularly logistics EDI, has been very slow.

However, such investment problem may also be potentially solved by the spread of Internet technology. Information sharing among firms can be carried out with Web-EDI, instead of a dedicated EDI line. Despite the fact that the Internet presents some problems on security and standardization, Web-EDI is advantageous because of its low cost of investment compared with construction of a dedicated line, and the enjoyable open nature of the Internet. From these merits, Web-EDI has provided opportunities in promoting information sharing between firms (Tsuru, 1998). Furthermore, the use of the Internet combined with ITS present opportunities to improve the urban logistics system

(Nemoto, et al., 2001).

Information sharing is not only introduced by the private firms, but by the public authorities, as well. For example, in international logistics, since the government authorities are not efficiently connected with each other or with the private companies when doing customs procedures, this becomes a source of bottleneck in logistics. According to the Ministry of Finance (2001), the cooperation of different systems, such as Nippon Automated Cargo Clearance System (NACSS) of the Ministry of Finance, Food Automated Import notification and inspection Network System (FAINS) of the Ministry of Health, Labor and Welfare, Japan Electronic open network Trade Control System (JETRAS) of the Ministry of Economy, Trade and Industry, and Port EDI of the Ministry of Land Infrastructure and Transportation, could advance information sharing, and provide one-stop services to reduce costs of information exchange.

In addition to the practical uses of EDI or web-EDI, Enterprise Resource Planning (ERP) has also been gaining wide attention. ERP is a method of managing information, such as sales, production, purchase, and accounting, aimed at sharing company information on real time. The introduction of ERP in each firm is mutually complemented by EDI in order to perform information sharing among the firms in SCM.

Second, as information sharing provides many data available, we should formulate problems based on the data, and find the ways to solve them. The development of application software to actually solve various problems has gained wider interest with the development of IT in recent years. The software for realizing SCM is collectively called Supply Chain Planning Software (SCPS.) SCPS includes several software on manufacturing planning, demand forecasting, transportation planning, inventory management, scheduling, etc. (Task IT Pocketbook Editor, 2000). Generally speaking, the progress of IT has promoted rapid sharing of information among firms needed for SCM, and has caused improvement in the quality of application software for processing information or supply chain planning software.

3. SCM and logistics

3.1 Logistics management in SCM

As mentioned above, SCM encompasses flow of goods, information and money from the raw materials supply stage, through production and consumption stage, and finally to the recycling stage. SCM is composed of several management tools. Different approaches in accounting, production management, information processing, marketing, etc. have been developed to solve the problems in SCM. For example, accounting approach to SCM mainly focuses on cash flow in the supply chain, while information processing approach focuses on the flow of information.

In this paper, we will take our attention to logistics in SCM, which is strategic management of goods flow in the supply chain. According to the CLM (Council of Logistics Management), logistics is that part of supply chain process that plans, implements and controls the 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. Logistics management includes inventory control, material handling, order control, transportation, warehousing, etc. Although the concept of logistics mainly focuses on goods flow, other flows such as information and money flows are also given attention. In particular, information management has close relation and then cannot be ignored.

3.2 Coordinating logistics in SCM

The general idea of logistics is to strategically manage the total flow of goods. Thus, logistics optimization is not only accomplished from the viewpoint of one firm, and therefore, total optimization of the flow of goods including firms in the supply chain is required.

When trying to optimize the total flows within the supply chain, it must be pointed out that the interests of firms in the supply chain may conflict due to the partial distribution of cost and benefit among the firms. Thus, coordinating the interests of the firms is necessary for logistics management in SCM. They likewise have different skills or competencies, which are complementary and require further coordination. For example, coordination is needed between the firms in the areas of production and transportation

planning. In fact, it is not easy to coordinate many firms with different profiles. If a parts supplier and a manufacture like to synchronize their production, they have to share their production schedules and coordinate transportation of parts between the factories. In order to realize this, they are required to have IT abilities and to fulfill their responsibilities correctly.

A firm, which possesses logistics know-how on coordinating economic resources, may have opportunities to make advises. Such a logistics coordinator, also called Third Party Logistics (3PL), has been gaining attention. 3PL is a new type of industry where the firm's logistics activity can be outsourced. It came into existence during the deregulation of freight transport industry in the 1980's, and has progressed in the 1990's along with the development of IT.

4. 3PL and its functions

4.1 What is 3PL?

Originally, 3PL means outsourcing logistics activities including transportation and warehousing to outside firms, which are not a consignor or a consignee. However, it is not common 3PL practice to outsource a single activity of logistics independently, but to outsource multiple activities from the firm's strategic point of view.

3PL (or 3PL provider) has the following features at present:

1. integrated (or multi-modal) logistics service provider
2. contract-based service provider
3. consulting service provider

First, a 3PL provider is regarded as an integrated logistics service provider. IT-related activities for controlling goods flow such as order processing, and inventory management, among others are also included in the function of the 3PL provider. However, the 3PL provider need not provide all the services solely. The 3PL provider can outsource some activities to sub-contractors.

A 3PL provider can be classified into the asset-based and the non-asset-based. The

asset-based 3PL provider owns some assets, particularly transport-related assets such as trucks, warehouses, etc., while the non-asset-based 3PL provider does not own such assets, and usually relies on sub-contractors' assets. Examples of non-asset 3PL providers include forwarders, brokers, marketing companies, and information system management companies.

Second, the service of 3PL is contract-based. Recently, a contract was written about the way to share responsibilities assuming various situations in detail. Such strict contract would make reliable relationship between the parties, and strengthen the alliance.

Third, offering consulting-services to the firms is an important feature of the 3PL. The 3PL provider can make various advises to answer customers' requirements concerned with marketing strategy, information system configuration, cooperative transportation, etc.

4.2 Advantages and disadvantages of 3PL

One of the advantages of using 3PL results from economies of scale (merits from large truck fleets, warehouses, etc.) and economies of scope, which encourage firms to increase net value by reducing costs. The effects of these economies are obtained depending on the type of 3PL provider (e.g. IT-equipped, marketing-based, non-asset-based (and then flexible), etc.) Competent 3PL providers possess high coordination ability, enabling them to search reliable partners or sub-contractors, and to manage efficiently the inter-firm flow of goods. Such ability can be developed through experiences as a 3PL.

Likewise, by outsourcing logistics activities, firms can save on capital investments, and thus reduce financial risks. Investment on logistics assets, such as physical distribution centers or information networks, usually needs large and lump sum costs, which involves financial risks. Furthermore, the 3PL providers can spread the risks by outsourcing to sub-contractors.

Although there are several advantages of using 3PL, some disadvantages also exist. It is not easy to establish a reliable and cost-effective partnership between the firm and the 3PL provider. In order to establish reliable partnership, efforts should be made in two stages; 3PL provider selection and contract signing.

First, in the stage of selecting a new 3PL partner, it is important to select the 3PL provider which has the ability to provide better services. If the firms cannot select reliable 3PL providers, they may suffer from economic losses. It is not easy for firms to judge the ability of the 3PL provider during the selection stage owing to the issue of information asymmetry between the firm (principal) and the 3PL provider (agent). To solve this problem, complex selection procedures are necessary to identify their ability. However, the complex selection procedures may involve additional transaction costs.

Second, it is important to establish a system to maintain their reliable partnership once the 3PL partner is selected. Information sharing and apparent risk sharing between the parties is always required. Concerning information sharing, it is needless to say that smoother information exchange will result in a more efficient logistics activity. However, related costs may increase if some information essential to the firm would leak. Therefore, the commitment of each party in information sharing is required, and a scheme to ensure these commitments has to be prepared. However, this would also involve additional transaction costs.

Constructing a risk sharing scheme between the firm and the 3PL provider is critical in establishing reliable partnerships. Some of the risks involved in using 3PL are demand risk, inventory risk, and financial risk, among others. The questions are on who will take these risks, and how to compensate the risk holders. "Gain sharing" is a popular example of a rewarding scheme in which the 3PL provider holds part of the risks, and then is given incentives based on the increase of the firm's profit. This risk-sharing method is apparently some sort of a division of work between the firm and the 3PL provider. Establishing good risk sharing also involves transaction costs, although the associated costs can be reduced through the cumulative experiences and IT development.

5. Interactive effects of SCM and 3PL

As mentioned above, SCM and 3PL have individual advantages. It is recommended that firms which aim to develop SCM, should utilize 3PL, and that firms which plan to introduce 3PL, should employ SCM. It is believed that SCM and 3PL have positive interactive effects, or synergy effects. This section will show the best combination of

SCM and 3PL that would benefit the firm with their interactive effects.

When a firm contracts-out logistics activities to a 3PL provider, the 3PL provider needs to establish transaction and inventory management systems involving other firms in the supply chain; i.e. supplier, manufacturer and retailer, etc. The 3PL provider does not usually provide all logistics activities solely. Some activities are outsourced to subcontractors. For example, non-asset 3PL providers may outsource a transport activity. Such relationship between the 3PL provider and the sub-contractor likewise constitutes a part of the supply chain process.

Figure 1 describes two kinds of alliance, SCM and 3PL. This figure is modeled on a supply chain of manufacturing industry, where parts or materials are well standardized, resulting that production outsourcing is easy and inexpensive. In the alliance of SCM, Manufacturer A and Supplier B have a principal-agent relationship. In the alliance of 3PL, Manufacturer A and 3PL provider D also have a principal-agent relationship. They have to be cooperative in order to enjoy economies of scale and scope, and have to be flexible enough to revise the contract or to switch partners if the market environment is changed.

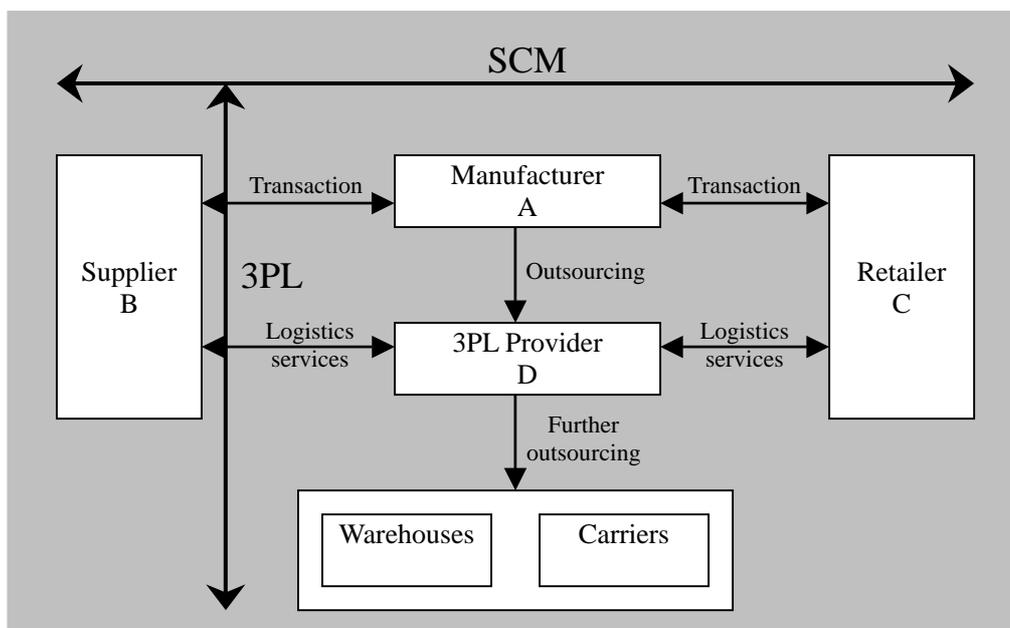


Figure 1 Two kinds of alliance – SCM and 3PL

Table 1 Advantages and disadvantages of SCM and 3PL

	SCM	3PL
<u>Advantage:</u> Creation of net benefit	<ul style="list-style-type: none"> • Economies of scale and scope • Concentration to core competence • Lead time reduction • Flexibility to customers 	<ul style="list-style-type: none"> • Economies of scale and scope • Savings on capital investment • Risk-sharing
<u>Disadvantage:</u> Increase of administration or transaction costs	Creation of SCM alliance <ul style="list-style-type: none"> • Searching efforts • Coordination efforts • Information sharing (e.g. production schedules) 	Creation of 3PL alliance <ul style="list-style-type: none"> • Searching efforts • Coordination efforts (e.g. risk sharing) • Information sharing

The advantages and disadvantages of SCM and 3PL are shown in Table 1. With SCM, firms can reduce total cost through economies of scale and scope and can increase benefit by improving customer services. The disadvantages include increase of administration or transaction costs in the selection of reliable partners and sharing of responsibilities.

The effects of 3PL are produced in a similar fashion as SCM. Advantages include cost reduction by economies of scale and scope, savings on capital investment, etc., while disadvantages include additional administration or transaction costs.

Figure 2 describes possible appropriate combinations of SCM and 3PL as characterized by the degree of logistics and production outsourcing. A low degree of logistics outsourcing (LOL) implies in-house operation, while a high degree of logistics outsourcing (LOH) could be realized in several forms; for example maximum utilization of e-logistics to match cargo and transformation needs on real time. 3PL is in-between (LOM) these two levels. A low degree of production outsourcing (POL) is observed in the case of a mega-manufacturer or a conglomerate, while a high degree of production outsourcing (POH) is performed by an e-manufacturer or an e-retailer which can procure the necessary parts or materials by web-trading. SCM is in-between (POM) these two levels. From this figure, we can forward three hypotheses.

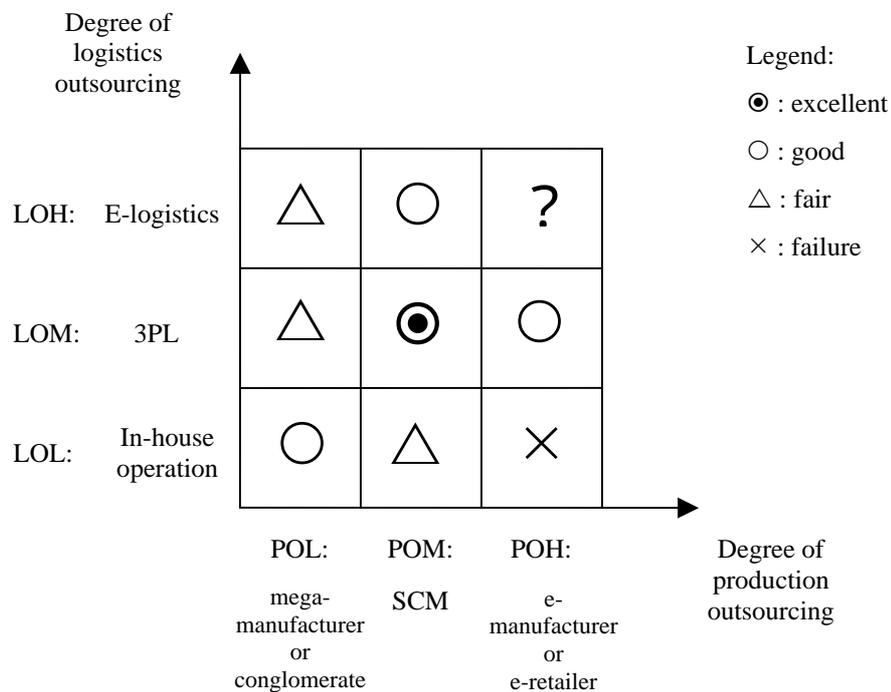


Figure 2 Strategic combination of SCM and 3PL

Hypothesis 1: given a firm which seldom outsources their production (POL), doing logistics activity in-house (LOL) might be suitable.

Hypothesis 2: given a firm which outsources most of production (POH), it might be beneficial to use 3PL providers (LOM). E-logistics usage (LOH) might be suitable but is unknown for firms without sufficient experiences.

Hypothesis 3: given a strategic SCM alliance (POM), best performance might be achieved using 3PL (LOM). Using e-logistics (LOH) might also be beneficial.

Hypothesis 3 means that the 3PL provider could demonstrate their full ability if a strategic SCM alliance exists. Although SCM and 3PL have a principal-agent problem by nature, combining SCM and 3PL has an effect to alleviate it. The 3PL provider can audit the performances of the firms in the supply chain fairly as an outsider, which gives good stimulus to the firms. In the same way, the upstream (or downstream) firm can audit the performances of the manufacturer and the 3PL as an outsider, giving suitable

advises to them. This is why the combination of POM and LOM is expected to be successful.

6. Conclusion

In this paper, we have considered the relationship of SCM and 3PL, and offered some hypotheses about logistics and production outsourcing. It is recommended that joint usage of SCM and 3PL should be promoted because of their positive interactive effects, as indicated by the hypotheses. That is, when firms are intent on introducing SCM, it would be beneficial to outsource logistics activities and utilize a 3PL provider. The reverse could be true as well.

Issues for further study can be classified into two: theoretical and empirical. First, as mentioned in hypothesis 2, we could not fully clarify the relationship between e-logistics usage (LOH) and the e-manufacturer or e-retailer (POH). This is because we do not have a confident perspective about IT and its implications on SCM and 3PL, partly owing to insufficient experiences. However, if we could acquire adequate cumulative experiences of e-business, we will be able to assume the relationship between LOH and POH. We could then offer new hypotheses and revise Figure 2. Second, we have to conduct case studies in order to justify our hypotheses empirically, which could also bring practical suggestions and recommendations for private firms, and bring new ideas for further theoretical development.

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