2. Literature Review

This literature review is composed of three parts. The first section deals with the problems in supply chain management. These problems build in the value challenges that inhibit firms to realize the full value of supply chain collaboration, which will be discussed in section two. The third section introduces the corporate capabilities to handle the challenges.

2.1 Problems in Supply Chain Management

Supply chain problems result from many causes such as natural disasters, labor disputes, supplier bankruptcy, as well as acts of war and terrorism. They can seriously disrupt or delay material, information, and cash flows, any of which can damage sales, increase costs — or both. Broadly categorized, potential supply chain problems include delays, disruptions, forecast inaccuracies, systems breakdowns, intellectual property breaches, procurement failures, inventory problems, and capacity issues (Copra and Sodhi 2004).

Facing the supply chain problems, the concept of managing a supply channel, in fact, is not new. It has been discussed since the late 1950s. The SCOR (Supply Chain Operations Reference-model) from Supply Chain Council (SCC) provides the integration of supply chain management activities, which includes current business activities, business process activities, and IT enabling activities (Figure 2-1). The basic structure of the reference-model focuses on the five key supply chain processes: Plan, Source, Make, Deliver, and Return. The plan process balances aggregate demand and supply to develop a course of action which best meets sourcing, production, and delivery requirements. The source process procures goods and services to meet planned or actual demand. The make process transforms products to a finished state to meet planned or actual demand. The deliver process provides finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management. The return processes associated with returning or receiving returned products for any reason. The return processes extend into post-delivery customer support (SCC 2002).

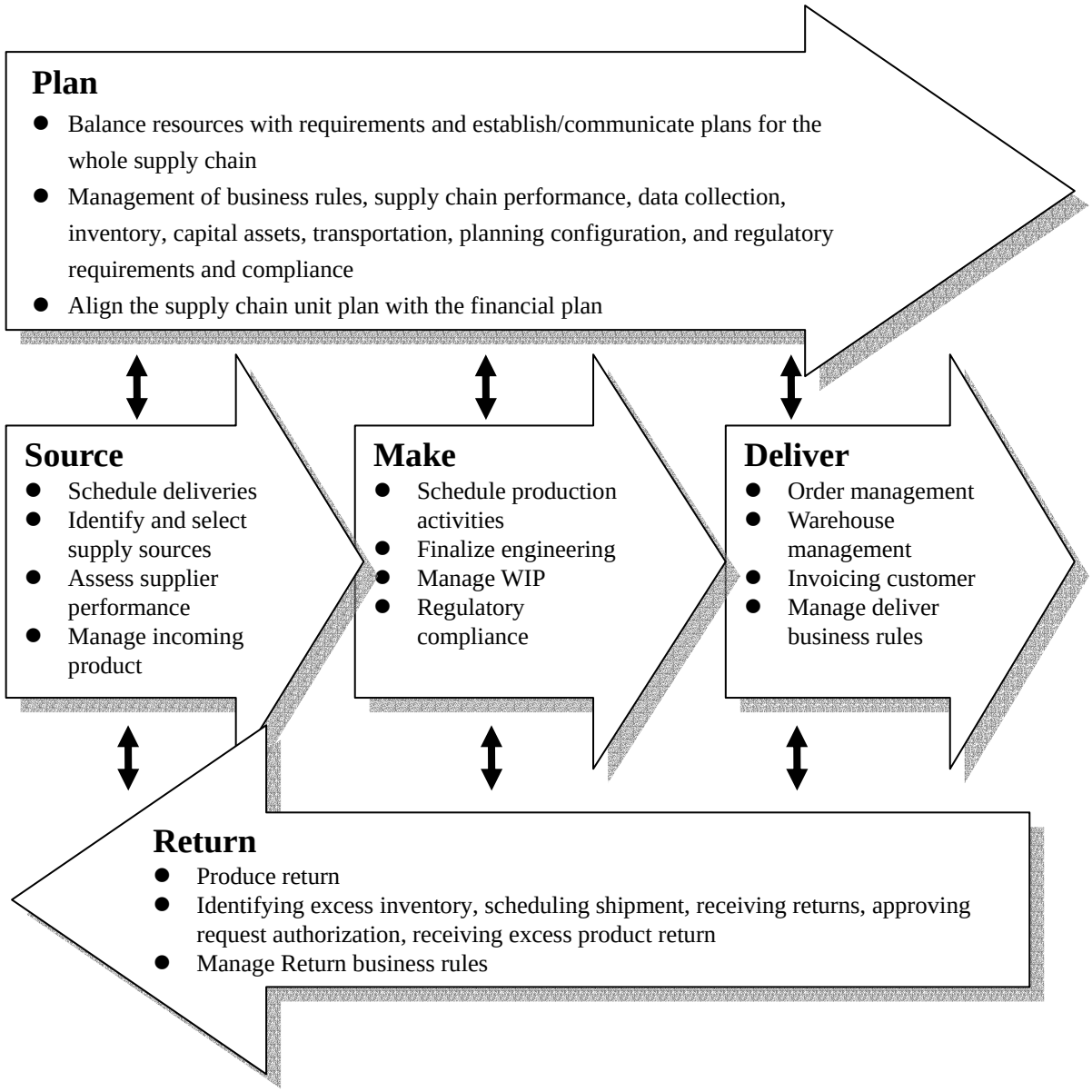

Figure 2-1. SCOR Model
Source: Supply Chain Council, 2002

The activities in processes of the SCOR model incur all kinds of supply chain problem. In the plan process, the company has to collect the accurate and timely information to plan the schemes that align expected resource to meet expected demand requirements. Nevertheless, the insufficient and asymmetric information problems could happen because it is hard to acquire the timely, accurate, and complete information. Under the source process, various activities are included, such as vendor certification, receiving and inspection of material, quality restriction, and material issues. Consequently, such problems may happen: disqualification of the vendors, delays in material flow, poor-quality output, high levels of handling or inspections, and changing transportation modes during shipping. In the make

process, the company has to decide production schedule, plan demand of components, manage the facilities and equipment, and test the product, therefore the machine breakdown, information system crash, unstable network, underproduction, and the excess investment to produce some products are problems to the company. In the deliver process, the company coordinates deliver business rule, maintains and enters orders, generates quotations, and configures products. It faces the problems resulting from customer purchase or shipment, such as order change, bad debts, and inventory issues. In the return process, the company has to manage return business rules, return inventory, capital assets, transportation, network configuration, and regulatory requirements and compliance, therefore, the return issues are the problems to the company.

2.2 Value Challenges in Supply Chain Management

Though some of the problems mentioned above may be avoided if firms follow the normal procedures to doing business with trading partners step by step, companies find most of the supply chain problems result from the barriers, risks, and uncertainties incurred on the all level of cooperation in the supply chain network. Companies that do not deal with these obstructions carefully will increase the incurrence of the supply chain problems and reduce the overall supply chain performance. Therefore, these obstructions can be seen as value challenges in the supply chain collaboration. Based on the previous literature, we summarize four major types of value challenge in the following paragraphs.

Insufficient technology capability is the basic concern in the dyadic relationship between customers and suppliers. Having a good technology capability is also perceived by the firms as a pre-request of supply chain collaboration. For instance, the implementation of global supply chain planning system will reduce the machine breakdown and system crash, and further improve the transaction efficiency with coordinated partners (Chopra and Sodhi 2004). Iskandar, Kurokawa and LeBlanc (2001) propose that a supplier’s decision to implement interorganizational systems (IOS) will be influenced by the transaction frequency and proportion because lower transaction frequencies and proportions provide lower incentive for both parties to improve their coordination due to the lower potential benefits that can be realized.

The second value challenge is transaction-related risks. Past literature refers that increasing the coordination of resources involves transaction risks for managing the interactions and results in underinvestment in explicit coordination among economic activities (the potential benefits of coordination are not achieved), or in the interaction being managed within a single organization (potentially advantageous production economies from outside suppliers are sacrificed). Based on Clemons and Row (1992) and Kumar and van Dissel (1996), there are three major sources of transaction risk: transaction-specific capital,

asymmetries in information, and loss of resources control. The transaction-specific capital is investment by one party that has little or no value in uses other than the specific interaction for which it was undertaken. Returns on such sunk-capital can often be appropriated by the other party, particularly in situations of high uncertainty that necessitate incomplete contracts. The second source of transaction risk, information asymmetry, arises due to the lack of information in supply chain related activities. Asymmetries in information can create problems in monitoring performance, which can increase transaction risk. The ability to arbitrage is presently enabled by information asymmetries inherent in the current coordination structure. The third source of transaction risk, loss of resource control, occurs when resources are transferred as part of the relationship and they cannot be returned or controlled in the event of the termination of the relationship. Unlike transaction-specific capital, the resources concerned are not sunk, but have values in other transactions. Further, information and know-how are the most important resources subject to loss of resources control, since firms are very difficult to control access and subsequent utilization of such resources.

The lack of good supply chain relationship is categorized as the third value challenge to the supply chain management. For instance, delays in material flows often occur when a supplier cannot respond to changes in demand (Chopra and Sodhi 2004). Companies may also experience frustration when they have no ability to deal with the actions of another trading partner or have no knowledge about the readiness of their trading partners (Riggins and Mukhopadhyay 1994). In addition, the fear of losing bargaining power may also inhibit the coordination. Clemons and Row (1993) argue that one party can find himself or herself actually worse off under improved coordination, due to a loss of bargaining power, thus leading him to resist the change; this can true even if coordination yields a net economic surplus to the channel.

The last value challenge we want to emphasize is environment uncertainty. According to Bensaou and Venkatraman (1995), uncertainty about the environment creates adaptation and information processing problems for a firm in the supply chain. For instance, owing to the volatility of demand, the company usually can not react to order change efficiently due to lack of timely information (Clemons and Row 1993).

2.3 Corporate Capabilities to Handle the Limits

In view of these value challenges, there has been a series of in-depth studies about successful supply chain collaboration. Each scholar proposes different perspectives (e.g., financial perspectives, process perspectives, technical perspectives, and strategic perspectives) to investigate the success factors of supply chain collaboration. Some researchers show how advanced information systems are implemented as the most effective mechanism for

strengthening existing relationships and building new electronic partnerships among supply chain members (Bensaou and Venkatraman 1995, Bensaou 1997, Clemons and Row 1992, 1993). Other researchers propose that historical reasons, such as volume of exchanges, transaction error rate, and order fulfillment rate, are key criteria to select collaborators to develop strong long-term relationships within the supply chain network (Angeles and Nath 2000, Hart and Saunders 1998, Iskandar, Kurokawa, and LeBlanc 2001, Kumar and van Dissel 1996, Riggins and Mukhopadhyay 1994). Although many theories and concepts are used to analyze the critical success factors of supply chain collaboration, most of them focus on firm capabilities, partner capabilities, or both (Angeles and Nath 2000, Soliman and Janz 2003, Clemons and Row 1993). We think these studies only address one side of the problem. Facing the increasingly complex and dynamic business environment, enterprises have to consider not only the technical factors or firm factors, but also the factors that resulted from dyadic partnerships between focal firms and suppliers or customers. That is, the cooperative issues should be addressed on the perspective of the whole supply chain.

Some researchers have recognized the significance of supply chain capabilities. Riggins and Mukhopadhyay (1994) assert that companies with good supply chain capabilities can increase the interdependent benefits. Dyer and Singh (1998) emphasize the impact of relational rents on inter-firm collaboration, the benefits that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance. Angeles and Nath (2000) find that focal firms prefer to partner with suppliers that have good capabilities to handle supply chain problems including channel inventory management, manufacturing planning and scheduling, demand forecasting, and distribution and transportation planning. Further, Craighead and Shaw in 2003 argue that supply chain performance is dependent on multiple capabilities: supply chain partners capabilities, manufacturing firm capabilities, information technology capabilities, and operational capabilities. These capabilities, along with final customer’s desire, create and accumulate the value of the supply chain.

Although researchers use different concepts and theories to investigate supply chain capabilities, we discover that their perceived supply chain capabilities can approximately group into four levels: technology level, transaction level, relationship level, and environment level (Bensaou and Venkatraman 1995, Clemons and Row 1993, Dyer and Singh 1998, Dwyer, Schurr, and Oh 1987, Hart and Saunders 1998). We discuss each accordingly.

In the technology level, many researchers put their focus on the development of IOS technologies. They argue that implementing IOS technology can help corporations improve the transaction efficiency with their trading partners, thus becoming a significant supply chain capability the corporate would like to pursue. For instance, Bensaou and Venkatraman (1995) recognize that the transaction capacity supported by IT is a key dimension to affect supply chain performance, such as multiplicity of information channels between the two firms, the

frequency of information exchange, and the formalization of the information exchange. Riggins and Mukhopadhyay (1994) also assert that the benefits generated in an efficient transaction by IOS cannot be generated by other ways. That is, one firm's benefits are dependent on the way in which its trading partners implement and use IOS.

In the transaction level, Clemons and Row (1992) suggest that IT can reduce transaction risk by reducing the level of transaction-specific capital and by reducing the cost of monitoring and control among separate firms. Furthermore, pre-established concurrency control and security mechanisms can also reduce the possibility of transaction risks (Kumar and van Dissel 1996).

There is another important factor that affects supply chain performance, that is, relationships between trading partners. According to previous research, firms that have good relationships with trading partners can reduce transaction costs, negotiation costs, and uncertainty about the opportunistic behavior, thereby having a positive effect on performance. Further, better cooperative relationships between two parties allow them to work out difficulties such as power conflict, low profitability, and so forth. According to transaction cost reasoning, cooperative relationships can be viewed as efforts to increase resource utilization and to add value through closer explicit coordination of economic activities. Dwyer, Schurr, and Oh (1987) rely on Levitt's marriage analogy to consider how practically discrete transactions might progress into more durable associations supported by shared goals, planning, and commitment to the relationship. Just like husband-wife relationship the buyer-seller relations involve analogous benefits and cost, bring expanded responsibility, demand care and nurturance, and can entail costly dissolution. Hart and Saunders's (1998) study utilizes the electronic dyadic as the unit of analysis (e.g., dyadic partnerships between two large target customers and their respective suppliers) to investigate how to affect EDI use and electronic partnerships further. They discover that developing good relationships is an important way for firms to take advantage of the opportunities while mitigating the threat of vulnerabilities posed.

In addition to relationship issues, there are many factors resulted from dynamics and uncertainty of environment, which affect the relationship between enterprise and trading partners and the performance of the supply chain. On the basis of transaction cost reasoning, environmental uncertainty is an important factor that evokes shifts from market-based relationships toward more cooperative relationships. For example, Bensaou and Venkatraman (1995) recognize that the uncertainty about the environment would create adaptation and information processing problems for a firm in the supply chain. In their work, different levels of uncertainty and complexity with corresponding different ways of cooperation are discovered and the findings show that focal firm needs more commitments, more specific technology investment, and longer period of contract to control and maintain their commercial exchange with trading partners while under a more dynamic and uncertain

environment.

Above discussions are summarized in Table 2-1. Although each concept is important to investigate supply chain capabilities, there is no comprehensive framework to consider all important supply chain capabilities together. Therefore we aim to synthesize the previous research concepts to develop a supply chain capability construct. We argue that an enterprise with good supply chain capability should be able to handle the environmental uncertainty, IOS technology, transaction risk, and relationship among trading partners.

Table 2-1. Value Challenges in the Supply Chain Management and Corporate Capabilities to Handle the Challenges

Value Challenges	Instances	Capabilities to handle the challenges
Technology Level	◆ Machine breakdown ◆ System crash ◆ Unstable network	◆ Experiences of implementing IOS technology ◆ Multiplicity of information channels ◆ Frequency of information exchange ◆ Formalization of the information exchange
Transaction Level	◆ Potential benefits are not achieved ◆ Forecast risk ◆ Loss of resource control	◆ Information technology ◆ Concurrency control ◆ Security mechanisms
Relationship Level	◆ Delays in material flows ◆ Inability to deal with partners ◆ Loss of bargaining power	◆ Shared goals and planning ◆ Commitment to the relationship
Environment Level	◆ Order change ◆ Volatility of demand	◆ More commitments ◆ Specific technology investment ◆ Longer period of contract