

3. Development of the Supply Chain Capability Construct

A construct, also called a theoretical concept, has been defined as an abstract entity which represents the “true,” non-observational state or nature of a phenomenon (Bagozzi and Fornell 1982). This research frames theoretical and operational dimensions of supply chain capability based on Churchill’s (1979) guidelines for developing measures that have desirable reliability and validity properties. The first step is to specify the domain of the construct, followed with operationalizing the construct by developing a measurement instrument. The final step is administering the instrument by statistic analyses.

3.1 Domain of the Supply Chain Capability Construct

The domain of a construct is essentially a definition of the concept. Based on our previous discussion, a supply chain is a network of facilities that develops plans for managing supply chain resources, procures raw materials, transforms the materials into intermediate subassemblies and final products, and then delivers the products to customers through a distribution system. Combining this definition with the concept of capability yields:

Supply chain capability is a company-owned ability to well operate company’s supply chain networks, which can efficiently aid the companies to handle the collaborative activities with their trading partners. The scope of considering the supply chain capability is from the basic technology level to the environment level, which include how to improve the transaction efficiency, how to reduce the transaction risk, how to promote a good relationship, and how to resolve the uncertainty in the dynamic environment. These views are characterized by Figure 3-1.

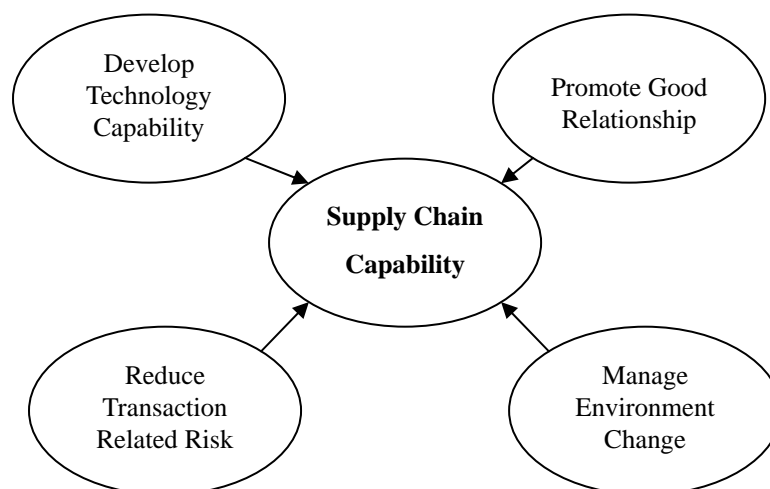


Figure 3-1. Research Framework for the Development of Supply Chain Capability Construct

3.2 Content Analysis of the Supply Chain Capability Construct

In reviewing the related literature in the past decade, several supply chain research models are discovered to be most related with our development. The models are shown in Table 3-1. They are proposed by Angeles and Nath (2000), Bensaou and Venkatraman (1995), Clemons and Row (1993), Dyer and Singh (1998), Kumar and van Dissel (1996). The resulting factors taken from combining these models are (1) IOS usage and integration, (2) information technology infrastructure, (3) transaction-specific capital, (4) information symmetries, (5) resources control, (6) trust, (7) complementarity, (8) management dependency, (9) the management of information uncertainty, and (10) the management of selling/buying uncertainties. The first two address company's IT capability, the next three are related with the resolution of transaction related risk, the following three contribute to good supply chain relationship, and the last two are factors of managing environmental uncertainty.

Table 3-1. Derivation of Supply Chain Capability from Existing Supply Chain Research

Supply Chain Capability Dimensions	Supply Chain Capability Factors	Angeles and Nath (2000)	Bensaou and Venkatraman (1995)	Clemons and Row (1993)	Dyer and Singh (1998)	Kumar and van Dissel (1996)
Develop Technology Capability	IOS Usage and Integration		Frequency and large volume usage of the information exchange			
	Information Technology Infrastructure		Information Technology Functionality	Information Technology		
Reduce Transaction Related Risk	Reducing Transaction-Specific Capital		Reducing asset specificity			Reducing transaction-specific capital
	Managing Information Asymmetries			Reducing information asymmetries		Reducing asymmetries in information
	Managing Loss of Resource Control					Resolving loss of resource control
Promote Good Relationship	Trust	Relationship management	Establishing mutual trust		Establishing informal safeguards	
	Complementarity	Complementary strategic direction and business vision			Complementary resource endowment	Avoiding the differences in IT, business practices, and culture
	Management Dependency	Avoiding lopsided IOS		Resolving bargaining power		
Manage Environment Change	Managing Information Uncertainty			Resolving uncertainty-based coordination problems		
	Managing Uncertainty of Selling/Buying Activities		Controlling task uncertainty			

According to previous research, we rely on the IOS usage and integration as well as the information technology infrastructure to show the technology capability. It has long been recognized that the high level of IOS usage and integration can contribute the supply chain performance. For example, Bensaou and Venkatraman (1995) propose that the greater the multiplicity of channels and the frequency of information exchanges, the greater the information processing capabilities of the dyad. They assert the information processing capabilities of a relationship will increase with greater intensity and scope of the use of the technology between the two firms. In similarly, Riggins and Mukhopadhyay (1994) suggest that the great volume of business communications for which the firm uses EDI and the high degree to which the firm becomes immersed in EDI of doing business as the efficient ways to maintain partner relationship.

Based on our previous discussion, the first resource of transaction risk is transaction-specific capital. Clemons and Row (1992) suggest that the characteristics of software used, such as reusability, modularity, replicability of know-how, coupled with open standards, IT support for conversion and transaction, and intuitive interfaces that reduce the costs of training or re-training can reduce this risk substantially. On the other hand, information asymmetries, the second source of transaction risk, mostly possibly occur in cases of performance measure ambiguity. Kuman and van Dissel (1996) refer that the performance measure ambiguity may be reduced by using information technology to generate and collect monitoring information that would otherwise be too expensive to collect manually. The third transaction risk that we refer in the previous section is loss of resource control. Loss of resource control occurs when resources are transferred as part of the relationship and these resources cannot be returned or controlled in the event of the termination of the relationship (Clemons and Row 1992). Information know-how is the most possible resource that may be lost of control, since firms are very difficult to control the access and subsequent utilization of such resources. Previous literature also shows that such resource contention and conflict can be much reduced while conducting pre-established concurrency control and security mechanisms beforehand. Besides, the control of such resource is better placed in the hands of a neutral third party such as a trade association, exchange, government agency, or a joint venture company (Kumar and van Dissel 1996).

In order to develop a good relationship, previous research proposes the following factors: long-term relationship, reputation, investment both sides, complementarity of technology, business practice, goal, and culture, as well as regulations to handle the management dependency (Dwyer, Schurr and Oh 1987, Dyer and Singh 1998, Hart and Saunders 1998, Kumar and van Dissel 1996). We summarize them into three categories: trust, complementarity, and management dependency and describe them in the following paragraphs respectively. Based on Dwyer, Schurr, and Oh (1987), trust is defined as “the belief that a party’s word or promise is reliable and the party will fulfill his/her obligations in

an exchange relationship". Lewis and Weigert (1985) recognize the significance of trust in uncertain/risky environment and refer that persons involved in a risky course of action can act competently and dutifully while they trust with each other. Therefore, trust is an important concept in understanding expectations for cooperation and planning in a relational contract.

Dyer and Singh (1998) define complementary resource endowments as distinctive resources of alliance partners that collectively generate greater rents than the sum of those obtained from the individual endowments of each partner. Similarly, Bensaou (1997) argue that compatibility in goals and technological capabilities reduce the uncertainty about the partner's inclination and potential intentions for opportunistic behavior and therefore invite cooperation. Interorganizational cultural differences are also likely to exacerbate the transaction risks by increasing the risk of different interpretations of the transaction contract (Kumar and van Dissel 1996).

Management dependency is another important factor to handle the fairness of supply chain relationship. According to Hart and Saunders (1998), relative dependence in a dyadic relationship between customer and supplier is a determinant of power. Often the powerful partners provide software free of charge, long term incentive, risk sharing, education seminar, and cost subsidy to less power company who otherwise may not be able to justify the investment (Riggins, Kriebel, and Mukhopadhyay 1994, Wang and Seidmann 1995).

Owing to the changing business environment, supply chain capabilities have to consider managing the non-technology and non-transaction uncertain factors, that is, environment uncertainty. The environment uncertainty can be viewed in two ways: information uncertainty and task uncertainty. In order to handle the information uncertainty, Clemons and Row (1993) suggest related technologies and systems to gather information surrounding supply chain environment, for example, a system to help firms gather dynamic information to forecast the customers' needs. Besides, open and frequent communications between firms and firms' partners is also a way to handle the information uncertainty risk (Angeles and Nath 2000). Task uncertainty arises due to the specific set of tasks carried out by the organizational agent responsible for the interorganizational relationship. In this work, the task uncertainty refers to the uncertainty of selling/buying activities because our research focuses on selling and buying activities of the supply chain. Bensaou and Venkatraman (1995) suggest that setting up the clearly known way, established practices and procedures employees follow, as well as detail and clear job descriptions are the ways and means to handle the uncertainty of selling/buying activities.