4. Research Methodology

4.1 Operationalization of the supply chain capability construct

The supply chain capability construct is conceptualized in terms of four dimensions described in last chapter. The content analysis of past literature that was employed in last section results in a pool of items that contained 33 items relevant to the dimensions found in Table 3-1. Similar items are consolidated into a single item, resulting in an initial pool of 26 items with at least 4 items in each dimension. Table 4-1 shows the measures for each dimension, operationalized using the items provided in the referenced studies. Each item is presented on a seven-point Likert scale. The complete questionnaire is shown in Appendix A.

Table 4-1. Item Measures for Supply Chain Capability Construct

Factors	**Items**	**Measures of Develop Technology Capability (TC)**
IOS usage and integration	TC1	Percentages of transaction by IOS links (Bensaou and Venkatraman 1995, Riggins and Mukhopadhyay 1994)
	TC2	Number of partners that are connected by IOS links (Bensaou and Venkatraman 1995)
	TC3	Degree of IOS integration with each process (Bensaou and Venkatraman 1995, Riggins and Mukhopadhyay 1994)
	TC4	Degree of IOS integration with current enterprise systems (Bensaou and Venkatraman 1995, Riggins and Mukhopadhyay 1994)
	TC5	
Information technology infrastructure	TC6	Degree of technology investment in IOS (Riggins and Mukhopadhyay 1994)
	TC7	Establishment of IT infrastructure (Bensaou and Venkatraman 1995, Iskandar, Kurokawa, and LeBlanc 2001)
	TC8	Establishment of applications to support tasks (Bensaou and Venkatraman 1995)
Factors	**Items**	**Measures of Reduce Transaction Related Risk (TR)**
Reducing transaction-specific capital	TR1	Successful implementation experience (Clemons and Row 1992)
	TR2	Modularity and replicability of know-how (Clemons and Row 1992)
	TR3	Following the industrial standard (Clemons and Row 1992)
Managing information asymmetries	TR4	Pre-established security mechanisms (Kumar and van Dissel 1996)
Managing loss of resource control		

Table 4-1. Item Measures for Supply Chain Capability Construct (Continued)

Factors	**Items**	**Measures of Promote Good Relationship (GR)**
Trust	GR1	Existed undergoing supply chain collaboration projects (Bensaou 1997)
	GR2	Establishment of clear norms for business behavior (Bensaou 1997, Dyer and Sigh 1998)
	GR3	Sharing confidential or proprietary information (Angeles and Nath 2000, Dyer and Singh 1998, Soliman and Janz 2003)
	GR4	Open and frequent communications (Angeles and Nath 2000)
Complementarity	GR5	Similar IT infrastructure (Konsynski and McFarlan 1990, Kumar and van Dissel 1996)
	GR6	Compatible company culture (Dyer and Singh 1998)
	GR7	Similar decision processes to handle transactions (Kumar and van Dissel 1996)
	GR8	Providing similar support of cooperative firms by top management (Angeles and Nath 2000, Bensaou 1997)
Management dependency	GR9	Technology support or cost premiums (Riggins and Mukhopadhyay 1994, Wang and Seidann 1995)
	GR10	Education seminars or system implementation expertise (Riggins, Kriebel, and Mukhopadhyay 1994)
Factors	**Items**	**Measures of Manage Environment Change (EC)**
Manage information uncertainty	EC1	Related technologies and systems to help gather information (Clemons and Row 1993)
	EC2	Explicit regulations to measure trading performance (Kumar and van Dissel 1996)
	EC3	Sending the timely, accurate, and complete information (Angeles and Nath 2000)
Manage uncertainty of selling/buying activities	EC4	Clearly known practices and procedures in doing inter-firm tasks (Bensaou and Venkatraman 1995)

4.2 Pilot Test

In preparation for large-scale data collection, the resulting questionnaire was pilot-tested by six executives that are directly responsible of IOS collaborations during fall 2004. These six executives come from three different types of firms in Taiwan PC industry: the component supplier, the service provider, and the manufacturer. The characteristics of these companies are summarized in Table 4-2. We chose these companies on the basis of representativeness and accessibility, following the criteria of having had an inter-organizational connection for a long period and being well-known company in the PC industry. The findings of pilot-test are consistent with our model. Though these companies play different role in the PC industry, all of them agree the technology capability, good relationship, and risk resolution capability are success factors of supply chain collaborations, and thus companies owning these capabilities are able to achieve better supply chain performance.

Table 4-2. Companies Description

Company Name	Type of Business	No. of Employees	Net Sales *
X Inc.	Component supplier	6,800	508
Y Co., Ltd.	Semiconductor distributor	1,270	1,746
Z Electronics Inc.	Manufacturer	10,000	5,061

* 1. The data is source of 2003 Annual Report.
2. The amount in U.S. million.

4.3 Data Collection

After pilot test, we conduct a general survey in Taiwan PC industry to validate our proposed framework. Data were collected using a questionnaire instrument. We coordinated with six Taiwan PC firms, three of which have participated in our pilot-test. For each firm, a purchasing and/or engineering senior manager at the central division was first asked to select a set of suppliers under his or her responsibility. Then for each of the selected suppliers these senior managers helped identify the purchasing agent and/or engineer to whom we could send the questionnaire. The respondents were asked to answer the questions on a seven point Liker scale. The total data set constitutes a representative sample of n = 352. Among all returned questionnaires, 55 were found to be complete and usable; this represented a response rate of 15.625 percent. A wide range of demographic characteristics was covered by the returned surveys, which were submitted by managers in sales, information technology, procurement, and purchasing departments in companies that operate in different geographic locations in

Taiwan. The sample characteristics are summarized in Table 4-3.

Table 4-3. Characteristics of the Study Sample

I. Characteristics of the Respondents		
1. Average number of years worked in the company		4
2. Department group:		
Sales or Procurement	58%	
Information	33%	
Others	9%	
II. Characteristics of the Company		
1. Average number of years the company established		14
2. Average number of employees (thousand)		2
3. Average capital (billion)		$0.7
4. Average annual sales (billion)		$2.4
5. Industry group:		
Electronics	26%	
Electrical machinery	5%	
Information product manufacture	42%	
Semiconductor	7%	
Import-export business	15%	
Others	5%	