Chapter 1
Introduction

1.1 Research Background

The current global business environment is characterized by changeable demand, decreased customer loyalty, shorter product life cycles and mass-customized production, forcing enterprises to lower their costs and improve product and service quality in order to survive. The supply chain has to respond quickly and collaboratively to such a situation (Chan and Chan, 2005). Powell (1987) noted that changing environmental conditions lead to inter-firm collaboration. Beyond the buyer-supplier transaction relationships, companies can develop collaborative relationships including inter-organizational knowledge sharing, knowledge creation and knowledge usage, as they jointly perform activities such as research, design, production, marketing and logistics (Holsapple and Singh, 2000). Cases have shown that enterprises are increasingly collaborating with their partners, thereby shifting the nature of the traditional buyer-seller relationships from one that was adversarial to one that is collaborative (Tapscott, Ticoll and Lowy, 2000). Folinas, Manthou, Sigala and Vlachopoulou (2004) examined four stages of evolution of supply chain and depicted that the last stage, as establishment of dynamic networks between virtual organizations, focuses on the broad-based collaboration, including collaborative design, planning and demand forecasting etc., with high trust in the customer and partner relationships. Noekkentved (2000) stated that collaboration in supply chain involves optimizing and integrating various planning processes such as design, demand, capacity, production, transportation, sales, and merchandise planning etc.; additionally, Noekkentved proposed three categories of relationships in supply chain members as: (1) transactional relationship, (2) information-sharing relationship, and (3) collaborative relationship, which means "working jointly with others, especially in an intellectual endeavor".

In collaborative relationships, information is not simply exchanged and transmitted, but is also jointly developed by the buyer and seller. The

collaboration is an interactive, constructive, and knowledge-based process. Actually, there are five phases to construct collaboration: (1) goal or purpose recognition, (2) partner exploration, (3) establishing objective and governance structure, (4) implementation, and (5) termination (Hartono and Holsapple, 2004). Ireland and Crum (2005) stressed that "selecting the right partner is crucial for Collaborative Planning, Forecasting and Replenishment (CPFR)", and companies need to select appropriate trading partners in order to develop successful relationships. Many studies have found that the lack of trusted collaboration partners for sharing sensitive information including valuable financial, strategic and other operating data impedes collaboration in supply chains by enabling one trading partner to take advantage of others (Fliedner, 2003).

1.2 Research Motivation

The problem of selecting partners or suppliers has become a significant issue in establishing an effective supply chain system (Chen, Lin and Huang, 2006). Failure to take sufficient care in choosing the appropriate collaborative partners is a vital contributor to collaboration failure. Trust is a key factor in commitment among supply chain partners, and lack of trust frequently leads to inefficient performance owing to increasing transaction costs associated with the verification, inspection and certification of trading partners (Kwon and Suh, 2004). However, real gains can only be realized when supply chain collaborative partners trust each other and work to make business decisions and plans that are mutually beneficial (Daugherty et al., 2006). Unlike trust in business to consumer (B2C) relationships, trust in business to business (B2B) relationships remains poorly explored (Saunders, Wu, Li and Weisfeld, 2004). Relationships among participants in collaborative supply chain as virtual business relationships are project-based, since the partners have neither a history of interaction, nor any plan for future cooperation. However, trust in initial relationships in these temporary groups is often high (Kasper-Fuehrer and Ashkanasy, 2001). Additionally, Jarvenpaa and

Leidner (1998) noted that trust is crucially important in new and temporary organizations, since it acts as a substitute for the traditional mechanisms of control and coordination.

Reputation can be considered as a collective measure of trustworthiness derived from the referrals or ratings of community members. Empirical testing results have indicated that the reputations of business transaction partners significantly and positively influence the level of trust. Accordingly, partner reputation is an essential initial trust-building factor for individuals with no previous track record of working with a particular firm (Kwon and Suh, 2004; Koufaris and Hompton-Sosa, 2004). Personal experience is generally more important than secondhand referrals for establishing trust. However, in the absence of personal experience, trust is often based on recommendations from others (Josang, Ismail and Boyd, 2007). Thus, trust and reputation have become significant research topics in many fields (Mui, Mohtashemi and Halberstadt, 2002)

There are extensive literatures on partner selection in the supply chain fields. Summarizing these literatures, the research issues related to suitable partner selection can be divided into two categories: selection methods and selection criteria. The partner selection methods include qualitative, quantitative, optimization methods, Multi-Agents Systems (MAS), integer programming, integrated analytic hierarchy process (AHP), agent-based Contract Net Protocol (CNP), improved AHP by rough set, analytic network process (ANP) etc. (Mikhailov, 2002; Wu and Su, 2005; Liu and Hai, 2005; Fischer et al., 2004; Jiao et al., 2006; Xia and Wu, 2007; Jharkharia and Shankar, 2007). Meanwhile, the selection criteria used in partner selection can refer to the 23 criteria of Dickson, including net price, delivery, quality etc. (Dickson, 1996).

In a traditional transaction-based supply chain, the considerations or criteria to select trading partners mainly focus on the competence and capability to perform contract of the potential partner; meanwhile, the testimonies used to evaluate and select trading partners were provided by partner candidates themselves. The selection criteria and testimonies collection of traditional methods do not suitable for selecting an unknown

collaborative partner with high level of initial trust, and with honesty and benevolence to mutually share and develop sensitive strategic information.

1.3 Research Objectives

This study developed a reputation-based partner selection model (RBPS model) which was purposed to select a partner with high level of initial trust, whom the requestor enterprise has no previous experience to collaborate with, for a new business opportunity. The reputation system and referral networks were adopted to identify the objective and subjective testimonies from third parties to evaluate the partner candidates.

The RBPS model consists of two phases for selecting trusted collaborative partners, namely discovery phase and selection phase. First, during the discovery phase, the enterprise (as a trustor) issues a request seeking trustees who are willing and claim to be capable potential collaborators. Second, during the selection phase, the trustor gathered the information elements, namely testimonies, of partner candidates, obtained from the discovery phase, from third parties (as raters), with previous experiences of collaborating with the trustees, using the referral networks and reputation system. Subsequently, the testimonies were translated into the scores of initial trust due to the trust level was not obtained for long-term friendships, but for initial relationships. Finally, the trustor selected the candidate with the highest initial-trust score to be a collaborative partner.

The experiments were designed to test the RBPS model that can help the trustor enterprise to select a partner candidate with fine characteristics in a distributed-networked environment. The results of computer simulation showed that the candidate with fine temperament was selected far more often than other candidates after multiple tests of simulation in a specific combination of factors and values. Further, the two critical factors, such as (1) the number of friends of the trustor and (2) the number of searching depth in the referral networks that strongly affect the

results of the RBPS model were identified by using the ANOVA test. Finally, the critical values of two critical factors, that make the trustor selects a fine trustee with high level of initial trust score, also be identified. The RBPS model can be implemented as a decision-making tool by intelligent software agents capable of automating the partner selection process, reducing the searching costs, and then accelerating the implementation of collaborative supply chain.

The rests of this dissertation are structured as follows. Chapter 2 reviews related works. In Chapter 3, the contents and numerical examples of the RBPS model are illustrated, and Chapter 4 presents the experiments and results. In Chapter 5, the conclusions which include key findings, contributions, limitations and future research directions are presented.