Chapter 11
Collaboration in Cyber Transportation Logistics: Paradigms and Technologies

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ABSTRACT
Although the topic of supply chain (SC) and logistics (L) has been discussed in many fora, placing it in today’s cyber (e) space is still a subject that receives little attention. This paper analyzes the role of e-SC/L in the context of global business to business (B2B) electronic commerce (e-commerce). A major beneficiary of e-SC/L are small and medium enterprises (SMEs), who can leverage information technology to bypass the extra cost associated with employing a third-party broker, who traditionally bridges the gap between suppliers and retailers. In this paper, a framework for incorporating both e-commerce and e-SC/L for SMEs is proposed in an e-marketplace context. The model consists of a trading platform with e-SC/L capabilities, and a classification scheme for different levels e-SC/L collaboration, presented with relevant types of information, communication and transportation technology (ICTT) needed to facilitate the design of each collaboration level. Included in the highest level are transportation, identification, and modeling and simulation technologies that enable the design of effective forward-looking collaboration.

BACKGROUND
E-commerce has been on the rise for SMEs since the 1990s. According to U.S. Small Business Administration, more than 65 percent of B2B purchases are made by six sectors (retail trade, motor vehicle manufacturing, shipping, industrial equipment, high-technology sectors, and government). This accounts for about 24 percent of total B2B commerce and is considered to have larger impacts across the economy than business-to-consumer e-commerce. Projection for growth...
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has been at a compound annual growth rate of 41 percent between 2000 and 2005 (SBA, 2000).

Figure 1 documents the growth of e-commerce core functions over the last two decades for all industries. Early 1990s was the reactive Web era. Mid 1990s was the Interactive Web era. The start of the 21st century launched the integrative Web era. Although WWW communication had opened in the reactive era, a request for information was still one-way. Businesses could only react to requests. The reactive era ended around 1995. Need arose for the interactive two-way negotiation of buy–sell transactions. The interactive era spanned between 1996 and 1998. By tracking the footprint of a participant, cookies allowed interactivity. The integrative era began in 1999. Through web sites that were both marketplaces and management platforms, it became possible to improve collaboration, strategic alliances, and one-stop business services.

In Figure 1, the symbols (circle, square, and triangle) represent core functions of reactive, interactive, and integrative nature, respectively. The numerical values shown in the figure were the count of respective core functions that had occurred in the surveyed years, expressed in terms of percentages. The scheme also represents an evolution of e-commerce and supply-chain business models with increasing levels of collaboration, visibility, and SC integration.

Web-enabled B2B e-commerce can enhance coordination between enterprises, resulting in transaction cost savings and competitive sourcing opportunities for the buyer organizations. In spite of increased use, the adoption rate for web-based business practices such as having a web site is only 58 percent for U.S. firms with less than 10 employees compared to 77 percent for large firms, resulting in not more than 10 percent of online sales by small firms in the area of B2B (Pratt, 2002).

Many SMEs handle their procurement through manual processes such as paper records, phone calls, e-mails, and faxes. Inefficient purchasing of goods and services has resulted in limited financial reporting, lack of readily accessible management information, lower levels of vendor compliance, and unauthorized spending. E-procurement solutions can potentially address these issues (Moozakis, 2001; Attaran et al., 2002), but most SMEs tend to lack the resources and technical expertise to install and maintain these systems.

Figure 1. E-commerce core functions: 1993-2001 (Chu et al. (2007), ©Elsevier. Used with permission