Semantic Matchmaking and Decision Support System for Dependable Supplier Selection in the Extended Enterprise Supply Chain

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ABSTRACT

Increasingly firms are competing through the formation of extended enterprises. An extended enterprise consists of a set of firms within a value chain that collaborate to produce a finished product. The case of dependable supplier selection, in the context of the extended enterprise, is complex where the focal firm has to select the supplier(s) for a specific class of customers depending on the value of those customers to the focal firm and the extended enterprise. This process requires careful consideration of a set of selection criteria to be used in selecting the suppliers. In this article, a semantic intelligent agent-based architecture and decision support system are presented for selecting dependable suppliers in the context of extended enterprise.

Keywords: Decision Support Systems, Extended Enterprises, Semantic Matchmaking, Supplier Selection, Supply Chain

EXTENDED ENTERPRISE AND CRITICAL ISSUES OF SUPPLIER SELECTION

Dyer (2000) defines the extended enterprise as the set of firms within a value chain that collaborate to produce a finished product. According to Dyer (2000), the fundamental unit of competition is no longer the individual firm but rather the extended enterprise. He further states that “In summary, at a fundamental level, relational rents are possible when alliance partners combine, exchange, or invest in idiosyncratic assets, knowledge, and resources/capabilities…that lower transaction costs or permit the realization of rents through the synergistic combination of assets, knowledge, or capabilities” (p. 82). Extended enterprise comprise of collaborative partners typically coordinated by a focal firm to jointly create value for the customer in the marketplace that is difficult if not impossible to create by any one single participating business.

Here, the firm, with efficient focused capabilities, as the unit of competition is replaced
by a dynamic, high-performance network with a focal enterprise that creates customer value by dynamically aligning the assets of collaborating partner organizations as shown in Figure 1. Firms achieve competitive advantage by creating value-networks of organizations that collaborate to create unique, hard-to-imitate customer value propositions (Frazelle, 2002). Increased competitive environment has brought supply chain management to the forefront, in the context of the extended enterprise, to help companies reduce costs, improve responsiveness, flexibility etc. Supply chain management is a mechanism to monitor and supervise the flow of information, knowledge, products and payments as they move along the supply chain (Ding, Benyoucef, & Xie, 2005). A typical manufacturing company spends a large part of its total costs on purchasing raw materials, subassemblies and components from external suppliers (Weber, Current, & Benton, 1991). In the textile and the semiconductor industries, as in many other industries, businesses are increasingly outsourcing the design and manufacturing of key elements of their products to a number of preferred suppliers (Ding et al., 2005). Competition is not between individual organizations but between competing supply chains, in the context of the extended enterprise (Cohen & Moon, 1990; Danneels, 2010).

This shift to outsourcing to partner organizations in the extended enterprise enables the focal firm to focus on its core competencies and better allocation of its resources to the primary processes. Outsourcing manufacturing can contribute significantly to a company’s profitability and return on investment and contribute to the financial well-being of partner organizations in the extended enterprise. Buyer-supplier relationships based solely on price are no longer acceptable for suppliers of critical materials or for organizations (focal firms) that wish to practice the latest innovations in supply chain management. Recent emphasis has also been on other important strategic and operational factors such as quality, delivery, and flexibility (Ghodsypour & O’Brien, 1998). Potential benefits include lower product cost, faster product introductions, higher quality and lower asset investment. In addition, the focal firm can maintain control of manufacturing processes, contractually through choices of components, configuration and design (Ding et al., 2005; Fawcet, Stanley, & Smith, 1997) based on prudent supplier selection as part of the extended enterprise.

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