

Chapter X

An Automated Negotiation Mechanism for Agent Based on International Joint Ventures

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ABSTRACT

One consequence of market globalization has been the growing incidence of collaborative ventures among companies from different countries. Small and large, experienced and novice, companies increasingly are choosing partnerships as a way to compete in the global marketplace. International joint ventures have emerged as the dominant form of partnership in light of intense global competition and the need for strategic organizational viability. The success of international joint ventures depends on many factors, but the most critical is vendors' selection from among many suppliers based on their ability to meet the quantity requirements, delivery schedule, and the price limitation. The supplier selection negotiation mechanism is often the most complex, since it requires evaluation and decision making under uncertainty, based on multiple attributes (criteria) of quantitative and qualitative nature, involving temporal and resource constraints, risk and commitment problems, varying tactics and strategies, domain specific knowledge, information asymmetries, and so forth. In this chapter, we propose a negotiation mechanism employing fuzzy logic to evaluate different quantitative/qualitative scale of each attribute, generating similarity matching with bilateral alternatives offered by buyer and seller agents, and then modeling some constraint-based rules for sellers when receiving counter-proposals from buyers, consequently proceeding to trade-off mechanisms between both sides to gain an agreement. The negotiation mechanism is mainly classified into five parts. We first define negotiation parameters set and iso-curve computation in the preliminary setting. Second, negotiation alternative processing service will be proposed to select

buyer's alternative based on iso-curve. After selecting negotiation alternatives, the buyer agent will send its alternative (counter-proposal) to seller agents to determine if it satisfies the seller's constraints, then decide iso-curve relaxation which is buyer's subjective behavior. Consequently, we use trade-off to find out buyer's partner and determine which attributes need to change along with the iso-curve. An example application to negotiating a supplier selection among agents to demonstrate the how the agents negotiation attribute parameters and reach the agreement. In the last part, post-negotiation analysis, we will compare two results from the preceding trade-off strategies (i.e., risk-seeking and risk-aversion) to inform decision making on how to make the most beneficial decision for a company. In our proposed negotiation mechanism scheme, agents autonomously negotiate multi-attribute fuzzy values of trade-off in an international joint venture selection tested with a notebook computer manufacturing company scenario.

INTRODUCTION

International joint ventures (IJV) are an increasingly important way for organizations to expand internationally. There is no apparent reason for this trend not to continue with pressures from global competition. Therefore, IJV becomes a major trend in cooperative business. The concept of IJV has been applied to many forms of cooperative business relations, like outsourcing, supply chains, or temporary consortiums. Specialization and flexibility are some of the key aspects of an everyday more dynamic and global market. The success of IJV depends on many factors, but the most critical include recognition of cultural differences, specified **workflow**, **information-sharing** through electronic data interchange and the Internet, and joint planning and other models that facilitate successful supply chain management. Technological support to the creation of such relationships is arising in many forms. The most ambitious ones intend to automate (part of) the process of creation and negotiation of IJV, mainly through **multi-agent** technology approaches, where each agent can represent each of the different enterprises. In fact, research on multi-agent technology addresses issues that fit the IJV buyer/seller relationship scenario. Agents are autonomous, interact with other agents, and enable

approaching inherently distributed problems with negotiation and coordination capabilities. The **negotiation** mechanism is often the most complex, since it requires evaluation and decision making under uncertainty, based on multiple **attributes (criteria)** of quantitative and qualitative nature, involving temporal and resource constraints, risk and commitment problems, varying tactics and strategies, domain specific knowledge, information asymmetries, and so forth. The negotiation cycle typically involves a sequence of interdependent activities (evaluation and decision making)—from suppliers' selection to enter the negotiation, through the negotiation per se to the execution of the agreed deal. Supplier selection and negotiation then are of a special importance for supply chain management. Thus, the objective of this chapter is to develop an agent-based cooperative negotiation mechanism which can be seen as a **decision-making** process of automatically resolving a conflict involving many parties over mutual goals.

In this chapter, we propose a set of negotiation mechanism schemes through employing **fuzzy logic** to evaluate different scales of each attribute, generating similarity matching with bilateral alternatives offered by buyer agent and seller agents, and then modeling some constraint-based rules for sellers when receiving **counter-proposal** by buyer, consequently proceeding to

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