

## Chapter 2

# Coalitional Added Services in a Linear Neutral e-Marketplace: An Approach Based on the Shapley Value

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### ABSTRACT

*The increase of transactions by electronic commerce (e-commerce) in Business to Business applications has a constant trend during last years. Many research reports have focused on negotiation and auction mechanisms in this context, but a smaller number of related research attempts, has chosen to develop coalition approaches. This research attempt tries to overcome this gap by an innovative coalition model for a private neutral linear e-marketplace that combines a full integration between customer's request and supplier's planning activity. The Shapley value approach is proposed to manage the profit sharing activity among the coalition participants. The Shapley value is an approach of game theory used to share a gain in coalition games. A proper simulation environment has been designed and modeled in order to measure the "stay-together economy" achievable within the proposed innovative e-marketplace. The simulation results highlight how the proposed approach increases the performance level of the e-marketplace: specifically the suppliers gain more benefits than the customers through the possibility of establishing coalitions.*

### INTRODUCTION

The increasing growth of transactions of e-commerce leads to focus the interest on e-commerce related applications, as the e-marketplaces. Especially in Business to Business (B2B) applications they are the most innovative tools to

support procurement actions utilizing Internet and, more generally, the Web technologies. Among the several definitions of e-marketplace, a basic definition has been proposed by Grieger (2003): "an e-marketplace brings multiple buyers and sellers together (in a "virtual" sense) in one central market space. If it also enables them to buy and sell from each other at a dynamic price

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*which is determined in accordance with the rules of exchange, it is called an electronic exchange; otherwise it is called a portal".* The benefits of implementing an e-procurement approach for both buyers and sellers are the following (Yu, 2008):

- it reduces the transaction costs; among several researches, Tully (2000) point out that e-procurement can achieve gross saving of 5% to 40%; in particular small firms can gain 15-25% reduction in prices in online marketplaces compared with those negotiated by the business itself (Ash, 2006);
  - it reduces the cycle time of the procurement process; firm that implement an e-procurement approach are forced to standardize the process and therefore some steps are automated. Moreover, the paperwork is eliminated and the time to decision is reduced;
  - it increases the geographical boundary; particularly for small firms, e-procurement allows to increase the visibility and therefore the enterprises contacted. In this way, the searching activity of new buyers/sellers is faster and cheaper;
  - minimize maverick (unplanned) buying; the improvement of the information flow and process standardized leads to mitigate this effect. The same motivations lead to reduce human errors in buying or shipping process.
- the increase of information across the supply chain partners can improve the decision making processes;
  - bargaining models among customers and suppliers can get benefit to the customers with reducing the price of transactions;
  - the order management such as: placement and tracking activities;
  - the integration of different logistic activities such as: warehouse management and transport;
  - the reduction of costs for the financial transactions.

An exploration study (Wang and Archer, 2007) on the different collaboration in Supply chains by e-marketplace (EM). The study highlighted that supply chain collaboration tends to be supported more than buying groups by existing EMs, and a high percentage of EMs now offers supply chain coordination and integration. Among online buying groups, the exchange-catalogue model is the most popular, possibly since it puts fewer burdens on members and coordinators.

Min (2009) explored various sub-fields of Artificial Intelligence that are most suitable for solving practical problems relevant to Supply Chain Management. The most popular tools can be subdivided in three categories: agent-based system, genetic algorithm and expert systems.

The research presented in this chapter regards the agent-based negotiation in Business To Business applications that are one of the most important Artificial Intelligence area of research for Supply Chain Management.

Many Small and Medium Enterprises (SMEs) handle procurement through an inefficient combination of manual processes, including paper records, phone calls, e-mails and faxes. This can lead to problems such as limited financial reporting, lack of readily accessible management information, lower levels of vendor compliance and unauthorized spending. The e-procurement solutions can address these issues, but most of

During the last decade the role of e-marketplaces in supply chain management becomes more relevant. Eng (2004) summarized the contributions of e-marketplace to Supply Chain Management are examined in three dimensions: unit cost reduction, increased efficiency, and streamlined operations.

The main processes where Business To Business e-marketplaces are important can be the following (Murillo, 2001; Khosrow-Pour, 2005):

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