Chapter 13
Capacity Sharing Issue in an Electronic Co-Opetitive Network: A Simulative Approach

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ABSTRACT

In recent years, manufacturing companies have entered a new era in which all manufacturing enterprises must compete in a global economy. To stay competitive, companies must use production systems that only produce their goods with high productivity, but also allow rapid response to market changes and customers' needs. The emerging new paradigm of inter-firm relations involving both cooperative and competitive elements, called co-opetition, seems well face this issue. The chapter proposes a multi agent architecture to support different coordination policy in an electronic co-opetitive network in which plants are willing to exchange productive capacity. An innovative approach based on cooperative game theory is proposed in this research and its performance is compared with the prevalent negotiation approach. A discrete event simulation environment has been developed in order to evaluate the related performances. The case in which no relation exists among plants has been considered as a benchmark. The obtained results show that the proposed approach outperforms the negotiation mechanism form many point of view.

INTRODUCTION

In this era of downsizing and outsourcing, where the business landscape is changing rapidly, the management of the external relations of the firm and the combining of this with internal operations represent a new problem and opportunity. Increasingly firms are recognizing the development and management of relationships both directly and indirectly with other members of the value producing system, conscious of the fact that they cannot survive and prosper solely through their own individual efforts: each firm's

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performance depends in important ways on the activities and performance of others and on the nature and quality of the direct and indirect relations as firm develops with these counterparts. Inter-firm relations involve a mix of cooperative and competitive elements. Firms simultaneously cooperate to expand the total amount of rewards and resources available to them and compete over the means to do this and over the division of rewards and resources. They compete to develop cooperative relations with counterparts such as customers and suppliers that are beneficial in order to create competitive advantages in creating value for final customers. Matching competition and cooperation (hereafter C&C) is a great and hard challenge for firms in this globalization era. The novelty of the topic proves the importance and the absolute relevance of research efforts aiming at providing a better understanding of this new organizational issue. Although some works are present in literature, identifying and providing evidence of the reasons of both competitive and cooperative relationships among firms, analyzing keys of success and causes of failures of these strategies are still open questions in both conceptual and empirical literature. On the other hand, determining strategies in these situations and studying their beneficial or detrimental effects on firms, consumers, suppliers and social welfare, designing proper mechanisms and providing incentives are absolutely open issues. When a rapport among firms includes elements of both cooperation and competition, i.e. these firms can compete and cooperate simultaneously, the relationship is called co-opetition. In order to better understand the reasons for assuming co-opetitive behavior, we should first reflect on the concepts of C&C. Competition occurs when many firms are producing the same or related products and are fighting for consumers, suppliers and/or resources, excluding collaboration with other companies. In pure competition the boundaries between competitors are sharp and distinct. Conversely, in pure cooperation there are frequent exchanges among partners, including business, information and social exchange. Inter-firm cooperation produces strong ties that cross the boundaries between firms in order to share complementary capabilities, assets and interests. The functioning of cooperative relationships may be regulated by formal contracts and/or informal agreements built upon social relations and the development of trust. It should be noted that cooperation and competition between firms are neither spontaneous nor exogenous, but are actions that depend upon the contextual conditions, i.e. the determinants of their level evolve over time, thus it is likely that the level of C&C between organizations will undergo variations (Luo, 2005). Some of the various determinants of competition are: a high level of overlapping in the market, a slight differentiation between the products sold by different firms, a lack of entry barriers to a market and a strong contractual position enjoyed by clients and/or suppliers. Instead, some determinants of cooperation among firms are: an inability to achieve their goals with their own resources, a need to share the risks of a new initiative and an improvement in efficiency through the sharing of activities to obtain economies of scale. For all that reasons, various hybrid forms of co-opetitive relationships occur between the extreme forms of pure inter-organizational competition and pure inter-organizational cooperation. Following the seminal work of Brandenburger and Nalebuff (1996), a number of articles regarding the private sector argued that C&C among firms cannot be considered mutually exclusive (Bengtsson and Kock, 1999; Luo, 2004; Oliver, 2004) but, in spite of authors' suggestion few of them have used game theory to model situations in which both competitive and cooperative behaviors arise. Game theory makes it possible to move beyond overly simple ideas of C&C to reach a vision of co-opetition more suited to topical needs. This theory is a branch of mathematics that is concerned with the actions of individuals who are conscious that their actions affect each other. It is divided into two branches, called the non-cooperative and cooperative ones, differing in how they formalise interdependence among the players. In the non-cooperative theory, a game is a detailed model of all the moves available to the players. By contrast, the cooperative theory abstracts away