Chapter 2
An Analysis of the Impact of Business Networks on Technology Development:
Using Agent-Based Modeling

Maryam Ebrahimi
Azad University, Iran

ABSTRACT

This chapter proposes an agent-based model (ABM) of business networking at the level of an industry involving two technology products and populated with technology-based firms. Since technology-based companies trade technologies as products, the concept of new technology development (NTD) is generalized to the new product development. In ABM, each agent represents a small and medium-sized enterprise (SME) which might develop one technology based on some features including perceived value of the technology, perceived ability of NTD, and business network. By defining agents as being the current companies along with the new entrants, one can analyze the effect of the policy of "improving the entry of new companies into the industry" with and without business networking. The results of ABM demonstrated that business networking enhances the number of SMEs with the ability to develop new technologies, especially in a case where the number of new entrants is high.

DOI: 10.4018/978-1-5225-7086-8.ch002

INTRODUCTION

Today, as the business of having the technologies traded is vastly expanding, many firms, particularly technology-based ones, are dealing with the issues associated with new technologies themselves as well as their trading affairs. In such a business field, companies try to offer their developed packages of technologies in terms of products to be sold or licensed to several buyers, so as to maximize the gained profit. Technology firms are looking for technology trading partners to which they can establish long-lasting partnerships (Nawaz, 2012). Being defined as "know how" to manufacture and sell a needed product or service, technology is made up of three major components: the product technology which refers to the existing set of ideas within the product, process technology which refers to the required ideas for the product to be produced, and management technology that refers to managerial procedures undertaken to have the product sold (Capon & Glazer, 1987). Since technology-based companies trade know how as a product, the concept of the development of new technology in this study is generalized to the new product development (NPD).

Recently, as an important feature of technology-based firms, new technology development (NTD) is highly recognized; this is well represented in the continuous reduction witnessed in the technologies' life cycles along with the increasing rate of customer demands over time. However, considering their limitations in terms of technical and financial facilities, small and medium-sized enterprises (SMEs) have difficulties for getting involved in NTD (Ale Ebrahim et al., 2010). Krishnaswamy et al. (2014) suggested the technological innovations to be a leading cause for new product development and introduction of new products, so as they can give rise to the markets for such products and contribute to SMEs' growth. Accordingly, one can see stable, well-conceived, and well-organized innovation networks to bring many advantages to SMEs. However, once opened up to cooperate with their stakeholders, SMEs make the road to long-lasting competitive advantages (Iturrioz et al., 2015).

Making SMEs specialized in multiple fields (e.g. fostering alliances, supply chain value, and the exploitation of the partners' strengths), networking is seen to be of a high value for SMEs (Negrusa et al., 2014). In a supply chain, networking may be made up of different partners from suppliers, manufacturers, distributors, retailers, and customers; such a mix of partners within a network may add to the complexity of the network. Definition of the prime processes together with the associated partners represents the key point in the course of analyzing a supply chain network made up of SMEs. Min and Zhou (2002) declared the following partners to comprise a supply chain: 1) primary partners by which they referred to strategic business units (SBU); and 2) secondary partners referring to resource providers. The companies of