Chapter 14
Knowledge-Driven Agglomeration Processes:
An Agent-Based Simulation Study

Nunzia Carbonara
Polytechnic of Bari, Italy

ABSTRACT

According to the economic geography literature, firms tend to geographically cluster when agglomeration economies exist. These are positive externalities associated with the co-location of firms within a bounded geographic area. Traditionally, the agglomerative advantages have been expressed in terms of pecuniary externalities and they have been identified as one of the key sources of the geographical clusters' competitive advantage. However, in the last years the basics of competition are changed and the ability of firms to create new knowledge is more crucial for success rather than the efficiency in production. This has shifted the attention of scholars on the role of knowledge and learning for the competitiveness and success of geographical clusters. In line with these studies, the chapter suggests that agglomeration economies are related to both pecuniary externalities and knowledge-based externalities. The latter are benefits that co-located firms can gain in terms of development of knowledge. To investigate whether knowledge-based externalities affect geographical clustering of firms, an agent-based model is developed. By using this model, a simulation analysis is carried out.

1. INTRODUCTION

Geographical clusters (GCs) are concentrations of interconnected companies and institutions in particular fields (Porter, 1998). These systems of firms (including also Marshallian industrial districts) have been extensively investigated in the literature. Different aspects have been observed, and some notions and models have been developed aimed at identifying the sources of competitive advantage, such as the agglomeration economies concept introduced by Marshall (1920) and further formalized by Krugman (1991); the flexible specialization production model conceptualized by Piore and Sabel (1984); the in-

dustrial atmosphere notion conceived by Marshall (1919); and the *innovative milieux notion* developed by the GREMI (Maillat et al., 1993).

Referring to the notion of agglomeration economies, these are positive externalities (benefits) resulting from the co-location of economic activities that make the geographical cluster attractive towards firms and drive their location choices. In fact, the spatial concentration of firms generates several benefits, such as lower transportation costs, a higher production flexibility, a greater availability of specialized workforce and specialized input providers, as well as knowledge spillovers (Marshall, 1920; Porter 1998). For Krugman (1991), the benefits of agglomeration in essence depend on three factors: i) substantial increasing returns to scale, both at the level of single firm (internal economies) and the industry (external economies); ii) sufficiently low transport costs; and iii) large local demand.

According to the geographical economics literature, firms tend to geographically cluster when agglomeration economies exist[1], which consist mainly of *pecuniary* externalities (Krugman, 1991), because they gain from the reduction of production cost and/or the increase of the production efficiency. Thus, GCs are cost efficient spatial configurations and their source of competitive advantage is based on cost reduction.

More recently strategic management literature has highlighted the limit associated with a competitive strategy based only on two sources of competitive advantage (cost reduction and differentiation) and has recognized the importance of knowledge as a fundamental factor in creating economic value and competitive advantage for firms (Grant, 1997; Leonard-Barton, 1995). What a firm knows, how it uses what it knows, and how fast it can develop new knowledge are key aspects for firm success (Prusak, 1997; Hamel and Prahalad, 1994). Therefore, knowledge is a key asset for competing firms and learning is a key process, because it increases the firm's cognitive capital, i.e. the firm's knowledge stock.

In the last years, some scholars have analyzed the role of knowledge in GCs and proposed a knowledge-based theory of GCs (Malmberg and Maskell, 2004; Maskell, 2001b; Tallman et al., 2004). Some works have investigated the nature of knowledge circulating in GCs, the knowledge transfer and creation processes embedded in GCs, and the learning processes activated by firms in GCs (Albino and Schiuma, 2003; Albino et al, 2005). These are particularly effective in GCs, because proximity among firms largely enhances them (Baptista, 2000; Maskell, 2001a, Boshma, 2005).

These studies conceptualize GCs as venues of enhanced knowledge creation and they suggest that agglomeration economies are based on *knowledge-based* externalities (Lorenzen and Maskell, 2004; Maskell, 2001a). In this view, the very reason why a GC exists is to create a competitive advantage for the collective, as well as for individual firms, by enhancing individual firms' knowledge creation efforts (Arikan, 2009). In fact, the theory holds that geographic proximity increases not only the frequency of interactions between cluster firms but also the effectiveness of knowledge exchanges so as facilitating knowledge creation within GCs. Thus, firms can capture benefits from co-location not only in terms of lower costs or improved efficiency in production but also in terms of increased knowledge stocks.

The aim of this chapter is to contribute to the debate about the role of *knowledge-based* externalities in the process of geographical clustering of firms.

Could *knowledge-based* externalities explain the process of geographical clustering of firms? Do they are the very driving force of this process?

To address these questions, it is assumed that *knowledge-based* externalities are due to the existence within the GC of two processes of external learning (Malerba, 1988; 1992): learning by imitation and learning by interaction, and that the effectiveness of these learning processes is positively influenced by the geographical, cognitive, and organizational proximities among firms.

22 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/knowledge-driven-agglomeration-processes/144002

Related Content

Institutional Economics: The Historical Foundations of Institutional Economics
Zehra Doan Çalkan (2020). *Comparative Approaches to Old and New Institutional Economics (pp. 185-200).*
www.irma-international.org/chapter/institutional-economics/245328

NGO Sudhaar: Empowering the Livestock Dependents
Pragun Aggarwaland Ronit Anand (2015). *Promoting Socio-Economic Development through Business Integration (pp. 192-204).*
www.irma-international.org/chapter/ngo-sudhaar/132387

Environmental Regulation, International Trade, and Informal Sector: Theory, Policy, and Indian Experience
Tonmoy Chatterjee (2023). *Research Anthology on Macroeconomics and the Achievement of Global Stability (pp. 480-505).*
www.irma-international.org/chapter/environmental-regulation-international-trade-and-informal-sector/310849

The Resource and Leagile Strategy Model for Apparel Export Enterprises: A Proposed Model to Mitigate COVID-19 Uncertainties
Adeel Shah, Che Rosmawati Binti Che Matand Alisa Ibrahim (2022). *International Journal of Circular Economy and Waste Management (pp. 1-14).*
www.irma-international.org/article/the-resource-and-leagile-strategy-model-for-apparel-export-enterprises/288502

Economic Philosophy Facing the Good and the True
 (2022). *Wealth Expanding Theory Under the Principle of Efficiency-Equity Equilibrium (pp. 197-205).*
www.irma-international.org/chapter/economic-philosophy-facing-the-good-and-the-true/311794