

# Networks and Industrial Clusters

**Filipa Vieira**

*Universidade do Minho, Portugal*

**Fernando Romero**

*Universidade do Minho, Portugal*

## INTRODUCTION

On this case study, the aim was to understand the mechanisms for knowledge acquisition and its transformation in innovation performance by eight Portuguese firms of the moulds industrial sector. Emphasis was put on the study of interactions between several external or internal elements of the system. The two main research questions were: (1) If innovation reflects learning (Lundvall, 1992), how do firms learn, how do firms transpose learning, and are able to innovate? (2) What are the reasons for the innovative performance of the moulds sector in Portugal?

The study resulted in the creation and proposal of an observation model of the moulds sector, relative to the type of relations that exist between the firms and between firms and other institutions, which permits systematization and generalisation in the analysis of the innovative dynamics of this sector.

The innovative performance of the sector is also related with several of its intrinsic characteristics. By studying the firms, and the existing interactions, characteristics that are peculiar to the Italian industrial districts were noticed. This sector possesses some strong characteristics of industrial districts that have influenced and conditioned its innovative performance.

## A REVIEW OF THE LITERATURE

It is widely acknowledged that innovation is a key factor for competitiveness and that output growth and productivity depend on the development and diffusion of new technologies (OECD, 1997). However, the innovation process is not linear, but a complex and interactive one, involving business and non-business institutions. Kline and Rosenberg's (1986) "chain-linked" interactive model is an example of an innovation model that shows its interactive nature. Innovation is not the product of a

single inventive actor, but is the result of institutional and organizational interactions.

Accounting for its discontinuities and uncertainties, the concept of national innovation systems help understand why technologies develop along certain trajectories. In the study of national innovation systems, the interactions between the several elements that constitute the innovation system, including firms, academia, and research institutions, as well as other institutional actors, are analysed (Freeman, 1987; Lundvall, 1992; Nelson, 1993). The firms are at the core of this system, competing but also cooperating with each other (Dosi, Freeman, Nelson, Silverberg, & Soete, 1988).

Several authors (Beeby & Booth, 2000; Chung & Kim, 2003; Freel, 2003; Sousa, 1997) refer the importance of the interactions between firms and the social and economic environment where they are inserted, and the connections that are established with consulting firms and science and technology infrastructure institutions, emphasising the importance of R&D centres, and education and training institutions. Optimization of these interactions results in the establishment of (business and innovation) networks that thrive on the complementarities of competences or assets, on mutual dependence and in new economic organizational forms not primordially governed by contractual bind but by relations based on trust and risk and benefit sharing (Tece, Pisano, & Shuen, 1997).

Firms that show high levels of technological collaboration, either with other firms or with universities or research institutions, and acquisition of technology and mobility of human resources, are able to improve their innovative capacity both in terms of product and process. The easiness with which knowledge is transferred depends on its type. Explicit knowledge is formal and systematic, and it is associated with product specifications, formulae, or computer software. Tacit knowledge is partly technical capacity, but it also has a cognitive dimension formed by mental models and

perspectives, which are difficult to articulate. Socialization is the only way to transfer tacit knowledge between individuals, through observation, imitation, and practice (Arias, 1995).

Maybe because of that, geography and regions seem to have an accentuated importance for the development of systems and networks of new technologies. Local infrastructures, specialized human resources, local labour market, specialized services, and personal relations are fundamental and contribute decisively to regional development (Chung, 2002, Freeman & Soete, 1997; Muscio, 2006).

Regions are associated with concepts like cluster (Porter, 1992, 1998) or geographic cluster of small and medium enterprises (Carbonara, 2005; Piscitello & Sgobbi, 2004), and also defined as an industrial district (Becattini, 1990). Clusters are considered as a strategic opportunity for small and medium enterprises to prosper in certain industrial sectors, because firms located in clusters seem to be potentially more innovative than those that are not. That seems to be due to the fact that geographic or strategic proximity facilitate knowledge exchange between firms and other firms or other institutions (Porter, 1998; Staber, 2001).

Industrial districts are defined in the literature as production systems geographically concentrated, constituted by a large number of small and medium firms, which are involved in several production phases of the same product or product family. These firms are highly but differentially specialized in several phases of the production process, and their integration is done through the establishment of connections and cooperative agreements between those firms (Albino, Carbonara, & Giannoccaro, in press; Becattini, 1990; Chiarvesio, Di Maria & Micelli, 2004; Corolleur & Courlet, 2003; Giner & Santa Maria, 2002; Guerrieri & Pietrobelli, 2004; Marshall, 1998; Molina-Morales & Martinez-Fernandéz, 2004a; Piscitello & Sgobbi, 2004; Sammarra & Biggiero, 2001).

Starting from Becattini's definition of industrial district and based on several other works (Becattini, 1990; Capecchi, 1990; Carbonara, 2002; Day, Burnett, Forrester, & Hassard, 2000; Giner & Santa Maria, 2002; Marshall, 1998; Molina-Morales, 2005; Piore, 1990; Piore & Sabel, 1984; Piscitello & Sgobbi, 2004; Pyke & Sengenberger, 1990; Pyke & Sengenberger, 1992; Rabelloti, 1995; Sammarra & Biggiero, 2001), it is possible to enumerate a set of factors that characterises the industrial district concept:

1. There are many small and medium enterprises in a defined territory, with the same type of flexible production system.
2. There are strong cooperation links between firms, based on trust.
3. Besides the links between firms, there are relations between firms and local institutions that are connected to other firms and institutions located outside the district.
4. Firms specialise in one or some, but not all, phases of the production process, of a specific product or family of products (that can be intermediary or final products), resulting in the division of labour between firms. Each industrial district is associated with a product, which becomes distinctive of that district.
5. Production is flexible and responds to customer needs. Firms have the capacity to produce systems of products.
6. Independently of firm size, some firms sell directly to the final consumer, other manufacture only a part of the product or are engaged only in a part of the production phase.
7. The division between firms that sell directly their products to the final consumer or firms that are subcontracted by other firms is not rigid; both roles can be assumed by the same firm at the same time, or at different periods.
8. Relations between firms that sell directly to the market are, at the same time, of competition and cooperation; firms do not enter in conflict with each other, try to find new markets and avoid a destructive effect on the district.
9. There is a strong relation inside the district, namely between the productive structure and its socio-economic surroundings, existing, in a certain sense, a fusion between the firms and the community, due to the homogeneity of values; this is a fundamental requirement for the development of industrial districts.
10. "Pure" entrepreneurs in industrial districts are quite frequent. They act as imitators, adopters and improvers of international "state-of-the-art" technology in terms of products and processes.
11. The presence of leading firms that provide and help expand an international dimension to the district.
12. Human resource mobility: This characteristic is very important because knowledge is embedded

6 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/networks-industrial-clusters/17724](http://www.igi-global.com/chapter/networks-industrial-clusters/17724)

## Related Content

---

### How Digital Realities Will Change Professional Reality: Real-Time Multiplayer Jobs

Ricardo Melro (2020). *Managerial Challenges and Social Impacts of Virtual and Augmented Reality* (pp. 165-177).

[www.irma-international.org/chapter/how-digital-realities-will-change-professional-reality/248302](http://www.irma-international.org/chapter/how-digital-realities-will-change-professional-reality/248302)

### Can You Feel It?: Effectiveness of Anxiety Cues for the Design of Virtual Reality Exposure Therapy

Jessica Morton, Jolien De Letter, Anissa All, Tine Daeseleire, Barbara Depreeuw, Kim Haesen, Lieven De Marezand Klaas Bombeke (2021). *International Journal of Virtual and Augmented Reality* (pp. 1-17).

[www.irma-international.org/article/can-you-feel-it/298983](http://www.irma-international.org/article/can-you-feel-it/298983)

### An Interactive Space as a Creature: Mechanisms of Agency Attribution and Autotelic Experience

Ulysses Bernardet, Jaume Subirats Aleixandriand Paul F.M.J. Verschure (2017). *International Journal of Virtual and Augmented Reality* (pp. 1-15).

[www.irma-international.org/article/an-interactive-space-as-a-creature/169931](http://www.irma-international.org/article/an-interactive-space-as-a-creature/169931)

### Potential and Challenges of the Metaverse on Future Businesses

Dk Farhanah Izzati Pg Mohd Japarand Muhammad Anshari (2023). *Metaverse Applications for New Business Models and Disruptive Innovation* (pp. 102-119).

[www.irma-international.org/chapter/potential-and-challenges-of-the-metaverse-on-future-businesses/317296](http://www.irma-international.org/chapter/potential-and-challenges-of-the-metaverse-on-future-businesses/317296)

### On Being Lost: Evaluating Spatial Recognition in a Virtual Environment

Tomohiro Sasakiand Michael Vallance (2018). *International Journal of Virtual and Augmented Reality* (pp. 38-58).

[www.irma-international.org/article/on-being-lost/214988](http://www.irma-international.org/article/on-being-lost/214988)