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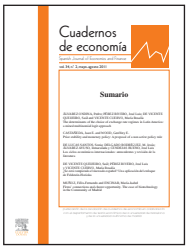

ARTÍCULO

Firms' connections and cluster opportunity. The case of biotechnology in the Community of Madrid

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Abstract Much of the Spanish biotechnology industry activity operates in the Community of Madrid (CM). Regional and local authorities are very interested in constituting a biotechnology cluster in the Community. All the necessary elements can be found in the region: as shown, there exists the opportunity for the emergence of a biotechnology cluster in CM. However, at the present time no biotechnology cluster can be said to exist as such in the region; there is only a *cluster opportunity*. In order to demonstrate this proposition, we provide an overview of the biotechnology industry, focusing on the firms that operate in Madrid and their connections between themselves and the other actors in the system. Any cluster strategy that aims to develop a biotechnology cluster in Madrid should consider the form of these connections.

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Conexiones entre empresas y oportunidad de clúster. El caso de las empresas biotecnológicas en la Comunidad de Madrid

Resumen Buena parte de la industria biotecnológica española opera en la Comunidad Autónoma de Madrid (CAM). Las autoridades regionales y locales están muy interesadas en constituir un cluster biotecnológico en la comunidad. Todos los elementos necesarios para que pueda surgir dicho cluster están presentes en la región: como se muestra en este trabajo, existe la oportunidad para que emerja un cluster biotecnológico en la CAM. Sin embargo, no se puede afirmar con total seguridad que tal cluster exista por el momento en la región; tan solo hay una oportunidad de cluster. Para demostrar esta proposición, proporcionamos una panorámica de la industria biotecnológica centrándonos en las empresas que operan en Madrid y sus conexiones con otras empresas del sector y con otros actores del sistema de innovación. Cualquier estrategia que busque desarrollar un cluster biotecnológico en Madrid debería tener en cuenta la naturaleza de estas conexiones.

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1. Introduction

Most EU Member States are currently developing national and regional clusters as part of their policies to respond to the objectives of the Lisbon agenda. The European Cluster Observatory (ECO, 2010) has calculated that 38% of the European labour force work in enterprises that operate as part of a cluster. Moreover, the ECO has identified more than 2,000 regional clusters in 258 of the European regions that were analysed.

A cluster is formed by a group of enterprises, institutions and R&D organisations (such as research councils, public and private laboratories, etc.) that share experiences and best practices. They also cooperate on common projects and coordinate their operations. Furthermore, they compete with each other to develop a more favourable competitive framework for their activities. Thus, a cluster is based on cooperation and innovation, and one key condition for its success consists of reaching a critical mass of resources within a geographical location. For a cluster to emerge, collaboration between (a) firms, (b) universities and R&D organizations and (c) regional and local authorities is of great importance.

However, the definition of cluster or the extensive literature on clusters does not offer a clear guide or objective criteria for establishing the sectoral and spatial limits of an industrial cluster. For example, there is nothing that determines a priori the detail of either the sectoral disaggregation that needs to be considered or the kind and intensity of the links between sectors and firms for them to be elements of a cluster. Porter himself claims that the delimitation of a cluster is a rather subjective issue that depends on the judgment of the researcher. This judgment usually implies a creative process that is determined by knowledge of the connections (or links) and complementarities that exist between firms and institutions (Porter, 1998, p. 202). The same degree of inaccuracy appears in relation to the spatial or geographical boundaries of a cluster, although it is obvious that the geographical dimension is very important to the concept of cluster: "A concentration of rivals, customers, and suppliers will promote efficiencies and specialization. More important, however, is the influence of geographic concentration on improvement and innovation (Porter, 1990, p. 157).

Consequently, there is no unique guide that allows us to establish a priori whether the geographic boundaries of the clusters are more or less extensive, or in which spatial dimension (if any) the generating forces of a cluster should be operating (business linkages, externalities knowledge, pecuniary externalities, social networks, etc.). In the definition of cluster there is no explicit and precise reference to the degree of spatial density of the activities or the interactions between agents in a limited geographical space. It is impossible to set a priori a threshold from which objective conclusions can be drawn about the presence of a cluster. Therefore, the degrees of freedom of any cluster analysis have to be necessarily high.

These circumstances allow the researcher to establish a particular methodology that allows him to focus on the characteristics of the cluster that merit more attention in his opinion. In our case, we are specially interested in the connections of the different elements of a cluster with the firms that operate within it. We prefer to focus on firms because they are, in our opinion, the main actors in a cluster. Firms provide employment, incomes and profits, products and services and they materialise the competitive advantages of the cluster.

The main objective of this paper is to determine whether or not a biotechnology cluster exists in the Community of Madrid at the present time and, if not, to find the main reasons behind its non-emergence. To do so, we set up a methodology which focuses on the description of the existing connections between the elements that constitute a socio-economic system with a specific purpose (in this case a cluster in the Biotech industry). This methodology is complementary to the more traditional one based on Porter's work (in the context of the Institute for Strategy and Competitiveness), which is based on measurements of the concentration and intensity of intersectoral relationships.

The paper is organised as follows: in section 2 we provide an overview of the main characteristics of the Spanish Biotechnology System of Innovation, of which the Community of Madrid biotechnology industry is a part. The main result is that, on a relative scale, the Spanish system generates many scientific publications but not enough patents, incomes and firms. This is said to be a common paradoxical characteristic of the Spanish innovation system. In section 3 we characterise the biotechnology industry in the CM and analyse the existence of a biotechnology cluster. In order to do this, we focus on firms and their connections (with each other and with other actors in the region). We have employed different statistics, data sources and interviews. Section 4 is devoted to conclusions.

2. The Spanish Biotechnology System of Innovation: 'Many publications and few patents'

In this section we present an overview of the main characteristics of Biotech industry in Spain in the period 2000-2008. This is the common framework in which the different regional biotechnology concentrations of firms carry out their activities in Spain. Along with relative strength in scientific production, there is a marked technological and productive weakness. This gives rise to an apparent paradox: how can Spanish science be unable to generate a productive activity of a comparable level? Although we will not address this issue explicitly in this paper, some of the causes are repeated like a fractal dimension in the biotechnology industry of the Community of Madrid.

2.1. Business and financial relevance of the Spanish biotechnology industry

Biotechnology is an emerging sector in the Spanish economy. The number of companies completely dedicated to biotechnology (CDB), i.e. firms that carry out R&D

1. CMIB are firms with a consolidated activity in biotechnology either as their main industrial activity or as an activity that is well incorporated into company strategy. The firms with such an involvement may use the techniques of both modern and classical biotechnology in the preparation of products or processes. These firms are evolving into biotechnology through a process of industrial diversification. This terminology has been taken from Díaz et al. (2002).