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Grenoble–GIANT Territorial Innovation Models: Are investments in research infrastructures worthwhile?

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ABSTRACT

Over the past decades, the EU heavily invested in Research Infrastructures (RI). What are the expected returns of such investments? In the present article we address the question of returns on public funds/public infrastructures.

We consider the role of RI and universities from an economic, social, and entrepreneurial perspective from various Territorial Innovation Models (TIMs): (1) Italian industrial districts, (2) innovative milieus, (3) regional innovation systems, (4) new industrial spaces, and (5) regional clusters.

We conducted our empirical study on Grenoble Isère Alpes Nanotechnologies (GIANT), which is composed of large scientific instruments, universities, and engineering and management schools.

Our microeconomic methodology measured the socioeconomic and entrepreneurial effects of GIANT with respect to budget, employment, and spin-off generation. We contribute to the existing body of knowledge on TIMs by (1) comparing the long-term investments to the generation of wealth, the creation of employment, and the development of start-ups; (2) adding new insights to the debate opposing positive and negative impacts empirical studies; and (3) offering recommendations for the use of public resources. In our discussion, we compare the GIANT model as a very localized RI-university club to the Grenoble model as localized cluster.

1. Introduction

To catalyze economic growth, the European Union nations are developing Research and Innovation Strategies for Smart Specialization (RIS3). RIS3 strategies "focus on policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, [and] they are evidence-based and include sound monitoring and evaluation systems" (European Commission 2011, p. 2). Overall, the aim is to promote coherent and structured investments, to catalyze innovation and research, to support the economic development in Europe, and to reduce the differences between European regions (Midtkandal and Sörvik, 2012).

In that context, Foray et al. (2012) argued that the knowledge triangle of education, research, and innovation is relevant in the context of smart specialization. In that sense, the concept of "smart cities" raised important questions related to human capitals, social capitals, economic aspects, training, and education. Caragliu et al. (2011) argued that the availability of an educated labor force and long-term investment explains the rapid urban growth and the success of cities. Moreover, past researches have shown spending on infrastructure has been very important in the EU over the last decade (Del Bo and Florio, 2012).

However, we know much less about the impact of infrastructure on economic activities, which prompts these questions: What are the investments worth? What are the expected returns of such investments? Considering the scarce availability of public resources, the question of returns on public funds/public infrastructures is of increasing interest. For instance, Breznitz et al. (2008) argued that there is increasing pressure on universities to generate economic returns and to contribute to employment of a skilled workforce. Lee et al. (2013) also argued that "In a world of increasing uncertainty, policy makers are recommended to focus on the implications of that long-lasting variability for societal value creation." (p. 342).

The question related to the return on investment of RI is not new. Rosenberg (1992) had argued that the impact of large scientific instruments on the economy requires further study. Similarly, O'Gorman and Kautonen (2004) encouraged further studies to measure policy interventions. More recently, Del Bo and Florio (2012) studied the returns on investments of infrastructures in European regions and pointed out that "the empirical evidence on the relationship between infrastructure and growth is still debated" (p. 1469). While a majority of empirical studies have concluded that the impacts are positive, some other researches highlight the negative impacts. There is consequently a

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need to better understand the return on investment of RI not only from an economic perspective but also from a more holistic perspective (Sable, 2007a). Consequently, we argue that answering such a question should be taken from not only an economic but also a social and an entrepreneurial perspective.

Socioeconomic and entrepreneurial regional development has been studied in the geographical economics literature by different Territorial Innovation Models (TIMs). We specifically consider the five following streams of literature that specifically consider the role of RI and universities from an economic, social, and entrepreneurial perspective in the following: (1) Italian industrial districts, (2) innovative milieus, (3) regional innovation systems, (4) new industrial spaces, and (5) regional clusters.

To explore the economic, social, and entrepreneurial impact of RI and universities, we have chosen to conduct our empirical study on Grenoble Isère Alpes Nanotechnologies (GIANT), a geographical network of RI, large scientific instruments, universities, engineering, and management schools. We posed the following research question: In light of existing TIMs, are the investments in RI in GIANT worthwhile from both a socioeconomic aspect and an entrepreneurial aspect?

Our intent is to contribute to the existing body of knowledge on TIMs by (1) comparing the long-term investments made in RI to the generation of wealth, the creation of employment, and the development of start-ups; (2) adding new insights to the debate opposing positive and negative impacts empirical studies; and (3) offering recommendations for the use of public resources for sound investments. Consequently, our research is meaningful and can guide policymakers in future decisions (Del Bo and Florio, 2012).

The article presents the theoretical background related to TIMs by focusing on economic, social, and entrepreneurial aspects that are relevant to the specific case of RI and universities. We consider the investments in GIANT, composed of eight scientific and academic partners located in the Grenoble Polygon, and measure the socioeconomic and entrepreneurial impacts of GIANT through a microeconomic analysis of competitiveness. We compare the intensive public investment in RI to the socioeconomic and entrepreneurial returns and further discuss the two different co-existing TIMs: The GIANT model and the Grenoble model. Finally, in our conclusion section, we suggest recommendations to policymakers.

2. Theoretical background

2.1. Regional governance

The role of RI has been strongly studied in literature dealing with the territorial approach. Five different streams of literature are relevant in our study: Italian industrial districts, innovative milieus, regional innovation systems, new industrial spaces, and regional clusters. Those streams are relevant because they focus on the economic, the social, and the entrepreneurial outcomes of the spatial agglomeration in which both RI and universities are playing a significant role.

The implication of RI within the regional development was first studied in the stream of literature named *Italian Industrial Districts*, which was guided by Becattini (1989). Becattini (1990) argued that an industrial district can be considered as a socioeconomic organization in which we cannot separate the economic factors from the social factors in a *socioeconomic vortex* (Becattini, 2003). Based on that study, we likewise argue that to best understand the impact of RI, we cannot dissociate the economic aspect from the social aspect. In a study of industrial districts, Markusen (1996) discussed different typologies, and one specific typology, the state-centered, raises our interest. In the state-centered typology, there is the domination of one or a few large public or non-profit organizations such as universities/RI that collaborate with both large and small firms. In such a setting, start-ups benefit from external economies, the availability of a skilled labor force, and the reduction of transaction costs (Amin and Thrift, 1992). Moreover, De Marchi and Grandinetti (2014) argued that spin-offs can easily be developed within such industrial districts.

At about the same time, those in innovative milieus were studying the interaction between innovation activities and space (Aydalot, 1986; Camagni, 1991; Camagni and Maillat, 2006; Ratti, 1989). Camagni (1991) specifically argued that an innovative milieu can learn from its universities thanks to social aspects, such as collective learning. Similar to the Italian industrial districts, such networks can be approached from not only a social but also an economic aspect.

In comparing countries, states, and metropolitan areas, Jaffe et al. (1993) argued that knowledge spillovers are geographically localized and concentrated. The smaller the geographical area is, the more significant the localization of spillovers. A city can also be a rich context for developing networks, and in support of this, Capello (2000) argued, "Non excessive city sizes in fact facilitate environmental equilibrium, efficient mobility and the possibility of conserving a sense of belonging as far as the population is concerned" (p. 1926).

However, the concept of city does not have the same features as the notion of innovative milieux (Maennig and Ölschläger, 2011; Rémy, 2000). Maennig and Ölschläger (2011) argued, "If exchange and interaction between the city and the milieu exist, two types can be distinguished. Firstly, the entire city forms the physical basis and the milieu is constituted through the urban relational capital and collective learning processes. Secondly, a single specialized industry within a city constitutes a milieu. In this case, the physical basis is an urban production system" (p. 443). Cities rely on geographical proximity, but innovative milieus depend on social proximity between individuals.

Regional Innovation Systems (RIS) were developed by Cooke (1992) to analyze the inflow of external knowledge and the interactive learning process between various organizations (Asheim and Coenen, 2005; Todtling and Trippl, 2004). In this stream of literature, much attention is dedicated to RI (Asheim and Coenen, 2005; Cooke, 1992; Cooke et al., 1997). The organizations, whether they are large firms or start-ups, taking part in RIS benefit from external knowledge developed by RI and universities (Asheim and Coenen, 2005; Iammarino, 2005; Lundvall, 1992). Public institutions are currently involved in animating innovation activities and encouraging local stakeholders to develop social linkages to boost regional growth (Cooke and Morgan, 1998).

Storper and Scott (1988) introduced the concept of new industrial spaces and scrutinized the contribution of various stakeholders. Saxenian (1994) provided an explanation of regional economic competitiveness and argued that in order to nurture technopolises, networks must encourage entrepreneurial initiatives. After studying the two stages of emergence and growth of the cities of Cambridge and of Grenoble, Druilhe and Garnsey (2000) argued that dominant firms, local universities, and policymakers are seeding new technopolises. A technopolis is highly path dependent and relies on knowledge developed by RI, especially for the creation of technological spin-offs.

Porter (1998a, 1998b) considered regional clusters a socioeconomic organization in which firms and other organizations, such as universities and RI, not only cooperate but also compete. Porter (1998b) argued that technology transfers are important in clusters and involve scientific institutes. Asheim and Coenen (2005) distinguished the role of public from private RI. Using the regional cluster framework, Andersson et al. (2013) studied local and international networks for Small and Medium Enterprises (SMEs) in the regional cluster dedicated to medical technology in the Rhône-Alpes region in France. They argued that local networks occur in a region where firms benefit from RI and universities.

Overall, the RI and the universities are considered differently according to the various TIMs. RI and universities play a central role in the Italian industrial district and in the Regional Innovation Systems, but they are rather considered one of the stakeholders of a regional network in the innovative milieu, new industrial space, and regional cluster. The interaction between such stakeholders can be considered from an economic perspective or a social perspective, or both. Finally, the creation of spin-offs and the creation of regular start-ups appear as being central