Technovation 45-46 (2015) 78–92

Contents lists available at ScienceDirect

Technovation

journal homepage: www.elsevier.com/locate/technovation

Research orientation and agglomeration: Can every region become a Silicon Valley?

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ARTICLE INFO

Article history:
Received 24 October 2013
Received in revised form
29 July 2015
Accepted 2 August 2015
Available online 14 August 2015

Keywords:
Regional innovation systems
Research orientation
Pasteur's Quadrant
Agglomeration effects
Context-sensitive policy

ABSTRACT

Not only success stories, such as Silicon Valley, but also non-success stories can inform regional innovation policy. In order to provide a benchmark for regional innovation systems we compare both success and non-success stories. Regional innovation systems differ in structural and functional requirements, because development processes are path dependent. We suggest that regions' development paths emerge from agglomeration patterns and research orientation. Accordingly, we have developed a typology of regions including (1) their agglomeration patterns (either MAR or Jacobs' type) and (2) the degree to which their research is predominantly oriented towards obtaining fundamental understanding or addressing considerations of use. We combine qualitative and quantitative data on thirty-six European regions to categorize them according to research orientation and agglomeration, thereby developing a typology. We use this typology and some basic quantitative economic data to see how success and non-success regions are distributed. Our results indicate that a better understanding of how to combine agglomeration patterns with research orientation can guide context-sensitive policy.

1. Introduction

Success stories, such as the tale of ever-vibrant Silicon Valley (Saxenian, 2006, 1990), appeal to practitioners and scientists alike, because these examples allow us to envision desired successes. Despite the growing interest of policy makers and scientists in regional learning and innovation, an increasing ambiguity exists in the evidence base (Morgan, 2004). Our understanding of the processes of innovation and learning at the regional level still has many blind spots. At the core of this ambiguity and lack of knowledge is our inherent favouring of success stories, thereby neglecting lessons to be learned from less successful but possibly more relevant endeavours.

During the early 2000s, policy for regional innovation systems stimulated linkages between university and industry as well as 'institutional thickness' (Morgan, 2004; Werker and Athreye, 2004). However, although important, neither can substitute for a strong local corporate sector or a strong scientific system (Dosi et al., 2006; Morgan, 2004). Therefore, there is no "ideal model" of policy regarding regional innovation (Tödtling and Trippl, 2005). By creating suitable conditions policy interventions can induce further development of regions to some extent. However, they never suffice to initiate or sustain innovation and technological change in regional innovation systems.

Recent innovation policy has been criticized for its tendency towards 'copy-and-paste' policy following successful examples of innovative regions, regardless of its fit with the specific regional innovation system at hand (e.g. Boschma, 2004; Hospers and Beugelsdijk, 2002; Tödtling and Trippl, 2005). There are a few examples of more sophisticated forms of regional benchmarking. Those benchmarks study various types of regional innovation systems and can be useful tools for regional policy makers (Huggins, 2010). Particularly, studying less successful regions – i.e. dysfunctional or failing regional innovation systems – would contribute to understanding regional innovation systems (Asheim et al., 2011a), and to improving regional benchmarking practices. Moreover, while policy and academic interest are often directed towards high-tech sectors, innovation policy should also stimulate regions endowed with low and medium tech, i.e. more traditional, industries (Tödtling et al., 2009).

Regional innovation systems with different contextual characteristics have different structural and functional requirements as research processes driving them are path-dependent (Malmberg

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http://dx.doi.org/10.1016/j.technovation.2015.08.001
0166-4972/

and Maskell, 1997). Instead of continuously analysing success stories, such as the Silicon Valley, it is crucial to recognize different contexts of regions and to also analyse non-success stories. To this end, a framework distinguishing three distinct types of regions, i.e. peripheral regions, old industrial regions, and metropolitan regions, provides insights into problems and suggests suitable interventions associated with failures in innovation systems (Tödtling and Trippl, 2005). The framework has been applied to case studies of specific industries or regions (e.g. Isaksen and Karlsen, 2013; Tödtling et al., 2011; Trippl and Otto, 2009) and is an important complement of the success-oriented stories in the literature, because it focuses on the non-success regions.

Following the suggestions of a number of recent influential papers (e.g. Arencegui et al., 2012; Bergek et al., 2008; Edquist, 2011), in this paper, we compare success and non-success regions. To do so we make use of two mechanisms that capture sources and evolution of success within regional innovation systems, i.e. research orientation and agglomeration patterns. In essence, regional learning and innovation are organic and self-activating processes based on local circumstances and development paths (Morgan, 2004). Regional *research orientation* constitutes local circumstances of regional innovation processes. At the same time *agglomeration patterns* point to the development paths. Both research orientation and agglomeration patterns are given in the short run but can be adapted in the middle and long run, thereby lending themselves for policy measures. Although there have been suggestions that agglomeration and research orientation may interact and affect economic success of regions (e.g. Feldman, 1994; Varga et al., 2012), our study connects the two concepts and studies their co-evolution.

Knowledge generation and diffusion affects many structural and functional elements in the regional innovation system, e.g. innovation activities by regional firms and other stakeholders such as academia and governmental agencies (Asheim et al., 2011a). For knowledge to diffuse, interactions between innovative agents in different subsystems of regional innovation systems are necessary. While innovative agents generate and diffuse specific types of knowledge they influence regional innovation systems' *research orientation*, i.e. the quest for fundamental understanding or attention for considerations of use (for details see Section 2.2). *Agglomeration patterns* materialize as a result of dynamic externalities, which have been identified as the source of innovation and economic growth (e.g. Glaeser et al., 1992; Jacobs, 1969; Romer, 1986). There are two kinds of agglomeration patterns, namely: MAR and Jacobs' externalities (for details see Section 2.3). While MAR externalities emerge from knowledge spillovers between innovative agents belonging to specialised and related industries (e.g. Glaeser et al., 1992), Jacobs' externalities result from knowledge spillovers between innovative agents belonging to various industries (Jacobs, 1969).

The paper is organized as follows: We start by introducing the idea of context-specific policy as well as investigating the co-evolution between research orientation and agglomeration patterns (Section 2). Subsequently, we introduce the data on thirty-six European Union (EU) regions we use as well as our research design and analysis (Section 3). After having typified all regions according to research orientation, agglomeration pattern and a number of basic economic indicators, such as regional GDP per capita and unemployment rates (Section 3.3) we analyse the success and non-success regions (Section 4.1). Our findings lead to theoretical propositions and we provide a revised version of Stokes (1997) quadrants with which one can theoretically assess regions (Section 4.2) as well as draft context-sensitive policy (Section 4.3). We conclude with a brief summary of our contribution to theory and practice and add suggestions for further research (Section 5).

2. Research orientation and agglomeration patterns guiding context-specific policy making in regional innovation systems

2.1. Context-sensitive policy making for regional innovation systems

Innovation has drawn academic and societal interest ever since works of Schumpeter (1934,1942) spurred its introduction. Traditionally, a linear perspective of the innovation process dominated the innovation studies literature, implying innovation to follow distinct stages starting at research and leading to eventual commercialization, without any feedback between those stages (Edquist and Hommen, 1999). This step-by-step thinking proved to oversimplify and misrepresent real-life innovation. Rather, innovation processes are iterative in nature, and characterized by trial-and-error and continuous incremental progress (Malmberg and Maskell, 1997). Consequently, scholars in innovation have diverged from the original perspective to develop evolutionary approaches (Kline and Rosenberg, 1986), system-based approaches (Edquist and Hommen, 1999) and, more recently, open up the innovation process (Chesbrough, 2006).

Our analysis adopts the regional innovation system approach acknowledging the evolutionary nature of innovation processes which are characterized by inherent uncertainty regarding successful routes and outcomes. The structural elements of regional innovation systems are the institutional framework, such as laws and codes of conducts, and the interlinked innovative agents, such as firms, universities and public research organizations (Autio, 1998; Tödtling and Trippl, 2005). Additionally, external conditions, such as national innovation system policies or neighbouring regional innovation systems, can have considerable impact on the regional innovation system (Fritsch and Graf, 2011).

While most analyses of regional innovation systems focus on success stories (e.g. Saxenian, 1990, 2006) context-specific policy benefits from a differentiated policy approach which is sensitive to different contexts and adheres to an evolutionary, non-linear view of the innovation process (Tödtling and Trippl, 2005). Different types of regions – i.e. metropolitan, old industrial and peripheral regions – face generic sets of problems. They benefit from policy measures aiming at the specific regional innovation system elements that can alleviate their particular barriers to regional innovation and learning. In each context regions face different problems: while metropolitan regions might suffer from fragmentation, which is characterized by a lack of networks, interactive learning, regional cooperation and mutual trust (Isaksen, 2001; Tödtling and Trippl, 2005), old industrialized regions might face lock-in, often expressed by strong regional clustering in mature and obsolete industries (Boschma, 2005; Isaksen, 2001; Tödtling and Trippl, 2004), and peripheral regions often suffer from organizational thinness, which is the case when a region lacks sufficient agents to form a functioning system (Isaksen, 2001).

In recent decades regional innovation policy has progressed and although still somewhat biased towards knowledge-based industries and technology transfer, it is less oriented towards solely spin-offs and attraction of global companies (Tödtling and Trippl, 2005). Similarly, there have been attempts to improve policies' sensitivity to the specificities of technologies (Dolfsma and Seo, 2013). Current innovation policy has become more sensitive to regions' specific conditions and contextual factors, which is exemplified in European Union policy initiatives and their uptake by regions. The smart specialization strategies are an example of more context-specific policy with potential for application in many different types of regions (e.g. Foray et al., 2009; McCann and Ortega-Argilés, 2013). This development in policy making has been fuelled by academic interest in the concept of 'related variety' (Asheim et al., 2011b; Boschma et al., 2012). Additionally, there have been studies looking into other difficulties. For example,