



Diversity and location of knowledge production in small cities in France



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ABSTRACT

We examine, as a way to measure creativity, the research activities in small and medium-sized French cities. We attempt to evaluate and map the knowledge production that occurs in these cities by searching for articles published in the Web of Science whose authors indicate professional addresses in such cities. We show that publications are written in these small and medium-sized cities and that their number has increased over the last few years. Moreover, the internationalisation of science exists in these cities. We will also demonstrate that the articles published in these cities are created by a heterogeneous group of entities that includes not only universities but also public research organisations, hospitals and firms. Finally, a complementary objective of the article is to present a methodology that allows researchers to ascertain and explore the geographical aspects of the dataset through the use of special-purpose maps and graphical tools.

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Introduction

This article studies research activity in small and medium-sized French cities. Indeed, research activity and more generally the production of knowledge are key elements to understand the development of cities in the new knowledge economy. Using a bibliometric analysis, we evaluate and map the scientific production that occurs in these cities, as a component of the knowledge production and creativity.

More precisely, we want to look for the place of small and medium-sized cities in knowledge production. As we will see, the literature on creative or innovative cities is generally focused on large cities and urban regions. However, we will show that small cities could produce knowledge and be active in the creative economy, also in the sector of scientific research. Second, we wish to know which types of organisations or institutions produce these publications. We demonstrate that research activity in small and medium-sized cities is not entirely the result of university researchers' activity but that of a diversity of creative organisms, which produces knowledge. We will also examine the collaborative activities of the

organisations located in small and medium-sized cities by looking into the addresses of co-authors, whether in the same city, in France, or in another country. As a complement to these empirical objectives, this article engages in a methodological investigation of how best to represent this production of knowledge in small cities cartographically, in order to facilitate the exploration of its spatial components.

Our analysis focuses on France not only because of the access to relevant data (and validation means) but also because France constitutes an interesting case. In France, the scientific system, and partially the economic system, are largely centralised around Paris and other large cities. France is also interesting because of the large number of small and medium-sized cities, which are distributed across its territory and organised into a complex, hierarchical, urban network. This network, classically organised in decreasing size following the administrative subdivision of the nation from the national capital to the village, contains some unique local specialisations in the form of industrial districts, technopoles, and historical production centres (Benko, 1991; Guillaume & Doloreux, 2011). In comparison with a simple central places model, we can bring out light spatial outliers (Christaller, 1933).

In the first section, we engage in a brief literature review of the geography of science. Second, we present data from

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the Web of Science and the methodology that we have used. Next, we present our results regarding research activity in small and medium-sized cities in France, focusing on global knowledge production in these cities, and the localisation of the collaborations of researchers located in these cities. Finally, we emphasise the diverse nature of the organisations producing knowledge in these cities.

Literature review

In the literature, creative cities are mostly large cities. In fact, authors tend to argue that only large cities developed the capacities to attract and retain the creative class. These large cities could also benefit from economies of agglomeration to maintain their creative capacities. [Scott \(2011\)](#) insists on the idea that only large cities could be creative ones by explaining that large-scale economics and economies of agglomeration are a necessary condition to allow the emergence of a creative city. Examples of creative cities cited in the literature are, for the most part, large cities like Los Angeles, London or Paris. In France also, creative activities have been localised in large cities (see for example [Chantelot, 2011](#) for a quantitative study or the case study of the region of Strasbourg by [Heraud \(2011\)](#)).

However, others authors, like [Bell and Jayne \(2009\)](#) have shown that small cities must be a subject of research by urban researchers and has a place even in reference to the creativity paradigm. Their argument is that “there is a clear need to look in detail at the actual political, economic, social, cultural, spatial and physical nature of small cities rather than judging them simply with reference to theories and measurements developed with reference to big cities and metropolises.” (p. 690). A few numbers of studies have examined the creativity of small cities. For example, [Selada, Vilhena da Cunha, and Tomaz \(2011\)](#) have proposed a case study approach to examine the creativity in small cities. [Gulumser, Baycan-Leventa, and Nijkampb \(2011\)](#) have proposed a qualitative measure of regional creative capacity, including rural region cities which could in general be assimilated to small cities. In these studies of small cities, authors sustain notably that small cities could have their own type of advantages that could attract the creative class, generally associated to wellbeing: quality of life, sports, healthy foods, preservation of the environment, etc. ([Lewis and Donald; 2009](#)). Our study will be focused only on small and medium-sized cities. We will try to show, at least partially by examining a sector of knowledge production, that these small and medium-sized cities could also be creative cities and could produce new knowledge.

However, to be creative, cities must attract, receive and retain a creative class. Florida defines creative class as “people whose function is to “create meaningful new forms” ([Florida, 2002, p. 8](#)) including creating new knowledge. Interestingly, this creative class presents a sub-group: the super creative class, which includes in particular scientists, engineers and university professors who have a very important role in the development of these creative cities. In our study, we will focus on this super creative class by looking for its knowledge production by measuring scientific production.

[Landry \(2000\)](#) explains that creativity and innovation are different. Creativity needs curiosity and imagination

to emerge; this creativity is required by the scientists when they create new scientific knowledge for a new scientific process or when they decide to publish a scientific article). These arguments justify why we will focus our analysis on the process of creation of knowledge through scientific publication. Scientific production is an important part of the creativity process (as well as the production of creative industries), which allows small cities to play a role in the knowledge economy. Moreover, our study will observe the different types of organisms that publish articles and, doing so, produce knowledge in these creative cities. We will underscore the diversity of places and organisms that participate to the knowledge creation and to the creativity of the cities. We focus this article on the existence of creativity (measured through the creation of knowledge) in these small cities. We don't study the question of the attractiveness of these cities to a specific creative class, even if we briefly introduce some factors explaining the presence of research firms and organisms. The scientific production of cities has also been largely studied in the economic literature, in the context of the debate between globalisation and deconcentration of scientific activities. Indeed, numerous authors have noted that science is a global phenomenon (for example, [Wagner & Leydesdorff, 2003](#)) with an increasing level of international cooperation among scientists. Nevertheless, despite Global Science, other studies have shown (notably in south-western Europe but also in South Africa and Russia) a general tendency towards the deconcentration of scientific production ([Miliard and Grossetti, 2006](#)). As stated in the introduction, our objective in this study is not to participate to this debate, notably because of a lack of consistent data about the knowledge production in large cities. We prefer to focus only on the diversity of scientific production, by providing a better understanding of the place of research in these intermediate-sized cities.

We can also find contributions to the field of “spatial scientometrics”, in the literature. These studies focus particularly on the question of the spatial distribution of research production and citation. However, a large majority of these articles (cf. [Frenken, Hardeman, & Hoekman, 2009](#) for a more detailed literature review) focus on national or even regional comparisons. Few articles focus on the city level of analysis, with the notable exception of [Bonaccorsi and Dario \(2005\)](#), who have tested for the existence of economies of scale in agglomerations in Italy and France; however, the focus of their study was on specific research institutions.

Data and methodology

The objective of our study is to evaluate and visually represent knowledge production in small and medium-sized cities in France. Before describing the data used to measure scientific production, we must establish a list of small and medium-sized French cities. Adopting the usual definition that geographers and statisticians use in France ([Barrère & Cassou-Mounat, 1980](#)), we defined small and medium-sized cities as urban agglomerations with fewer than 200,000 inhabitants. We have excluded overseas territories from the analysis because of a lack of reliable data on scientific activities in these regions. We have also excluded

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