

**Clusters and industrial districts: where is the literature going?
Identifying emerging sub-fields of research**

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Clusters and industrial districts: where is the literature going? Identifying emerging sub-fields of research

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Abstract: The industrial district and cluster literature has generated an extraordinary quantity of articles, debates, and topics for discussion, and encompasses one of the most vibrant lines of research in the field of economics, geography, management and related disciplines. The literature, however, is fairly fragmented. In this paper, bibliometric methods are used to analyze cluster literature published between 1957 and 2014 in order to explore *prospective* research priorities through the method of *bibliographic coupling*. Beyond focusing on foundational works in the past, this approach shifts the focus away from the practice of analyzing co-citations and seminal contributions to one of looking at current and emerging trends in the literature. Using the ISI-Web of Knowledge (Web of Science) as a database, examination of two samples of 3,955 and 2,419 articles is made. Results reveal the existence of sub-fields of inquiry that are following their own particular research agendas, which remain distinct yet interconnected to one another.

Keywords: cluster, industrial district, bibliometric analysis, Web of Science, bibliographic coupling.

JEL Codes: R1

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1 Introduction

Beginning with Marshall (1920), followed by Becattini (1979; 1990), Piore and Sabel (1984), Saxenian (1990), Krugman (1991) and Porter (1990), among others, the ideas of clusters/industrial districts² have evolved within different disciplines, approaches and using different units of analysis. All perspectives have emphasized the influence of location on performance.

The fast rate at which the number of publications on clusters is increasing, together with the variety of methodologies and perspectives employed, plus the size of the range of topics addressed, all make for difficulty in keeping track of the evolving literature on the subject. Recent contributions notwithstanding (e.g. Lazzeretti et al., 2014; Martinez-Fernandez, Capo-Vicedo and Vallet-Bellmunt 2012; Cruz and Teixeira, 2010), the cluster literature has seen very few objective *bibliometric* reviews carried out on it. Moreover, all those works which have reviewed the literature - tracing intellectual origins, producing a history of founders, or highlighting the most cited papers (e.g. Lazzeretti et al., 2014; Cruz and Teixeira, 2010) - have provided *retrospective* accounts by using direct citation counts and co-citation analysis. While scholars have become quite active in that literature, this remains rather fragmented, finding key contributions in economics, management or economic geography strands. These conversations sometimes are even disconnected from each other. This gap calls for a *prospectively* detailed and objective review of the literature in order to better understand the current state of the field and to provide some guidance for future research. In particular, our main goal consists of identifying emerging topics or lines of inquiry in the literature using bibliometric techniques.

In this paper, however, we leave retrospective co-citation analysis to others and suggest a different approach. This paper introduces to cluster scholars the method of *bibliographic coupling* (Kessler, 1963); this complements traditional *co-citation* analysis by enabling a different kind of analysis based on looking at current trends or emergent topics in the cluster literature. Thus, by applying bibliographic coupling this paper is able to detail in the cluster field current thematic expansions and diversifications, with the purpose to

² We recognize differences among them (see e.g. Asheim et al., 2011 for differences between “clusters” and “industrial districts”), but both concepts are used interchangeably in this paper and represent our focus

understand the current state of the field and its emerging conversations. This approach allows us to look to the future and consider the prospect for different research areas. Besides, our work perfectly complements constructively those previous works focused on retrospective accounts. In this paper, we focus particularly on cluster/industrial districts. The assessment and synthesis should make this field of research clearer to scholars, contributing to its integration and thus permitting a better diffusion among the scientific community.

Bibliometric tools are particularly useful in precisising magnitude and dynamics of the cluster literature. Bibliometric tools and surveys permit an objective assessment of emerging topics (prospective) and seminal contributions (retrospective). A structured analysis and quantitative approach to the literature through the application of *citation analysis* provides rigor, objectivity and a capacity for synthesis. In short, *co-citation* analysis and *direct citation* analysis used in previous works (e.g. Cruz and Teixeira, 2010) either trace the intellectual roots of the field by identifying foundational works, and so in this regard are past oriented (Gregoire et al., 2006), or measure the impact of publications. In contrast, *bibliographic coupling* detects *current trends* and future priorities as reflected by what is happening at the forefront of research, and measures publication activities or current production, rather than impacts, and shifts the focus away from past achievements to current trends (Vogel and Güttel, 2013). This serves to supplement rather than substitute for the results obtained using traditional co-citation methods (Jarneving, 2005). Bibliometric techniques and surveys complement those more qualitative surveys (e.g. Breschi and Lissoni, 2001; Malmberg and Maskell, 2002). Besides, the introduction of the *bibliographic coupling method* is a promising research tool for cluster scholars.

This paper positions itself at the forefront of debate in the industrial district and cluster field. It contributes to the literature by systematically reviewing current research trends, academic discourses, and the expansion of specific theme focused research communities. In doing so, the paper complements previous qualitative analysis, and also bibliometric works using different techniques and objectives. Besides, a key feature of this study is that it is based on an accessible database (Web of Science), allowing replication and extension by other scholars who can extend or replicate results. To avoid a reference bias, our point of departure is the totality of documents about clusters/industrial districts listed in the ISI Web of Knowledge (Web of Science) between 1957 and 2013. For this

reason, we run keyword queries to identify all scholarly articles published in refereed journals: 3,955 and 2,419 documents in two searches, covering more than 300,000 references on them. Our results delineate the conceptual and thematic boundaries of the cluster field, while differentiating between distinct but interrelated sub-fields or thematic groups of thought within it. In our view, the hitherto absence of the use of coupling analysis in the cluster field makes this research timely, complementing as it does previous research on the cluster concept's intellectual evolution. The article is structured as follows. Section 2 describes our methodological approach to mapping current trends in the field. Then, Section 3 presents our research design, data analysis and results. Section 4 extends empirics with a second search of documents. Finally, Section 5 provides our main conclusions and sets out future research avenues. One Appendix with additional data is also included.

2 Methodological approach: bibliographic coupling

There have been less bibliometric works identifying emerging topics or current existing knowledge areas within a discipline than there have been traditional studies focused on past citations or literature impact (Boyack and Klavans, 2014). Scientific research on a particular subject is concerned with the process of new knowledge generation, and as such it stands on, and departs from, pre-existing knowledge. The use of bibliographic references is the mechanism by which new knowledge is linked to earlier knowledge. The study of bibliographic references in scientific documents enables reconstruction of the intellectual process through which new knowledge is generated; serves to identify current knowledge areas; and determines the roles and influence of documents in subsequent literatures. In all, there are three methods used for identifying and analyzing bibliographic references: direct citation, co-citation analysis, and bibliographic coupling (Yang and Ding, 2012).

The most extensively used method is that of direct citation. This method produces highly visible and well recognized indicators such as the h-index or the impact factor. Thus, the higher the number of citations a document receives, the higher the impact the document is said to have on a scientific community. In figure 1, document 1 directly cites document 3. Thus, document 3 accumulates citations. Co-citation analysis, however, is focused on

quantifying how frequently a pair of documents is cited together in the literature. This enables the study of the influence of the cited documents; permits analysis of the interrelationships between the cited documents; and enables the identification of the most influential founders (cited documents and authors) in a discipline. In figure 1, documents 2 and 3 or 2 and 5 are co-cited, that is, they are jointly listed in the same list of references. Both methods, however, only provide a retrospective vision, informing how research has evolved over time. For this approach it is necessary for analysis to cover long time windows in order to be able to identify whether particular documents have been later browsed, or cited in subsequent studies (Gmür, 2003). See figure 1.

Figure 1 about here

A different focus and approach is offered by *bibliographic coupling*. This methodology identifies and quantifies those cases where documents cite the same references. The rationale is that documents that cite (citing documents) the same publications can be assumed to be related, and the higher the number of shared references then the greater the *thematic* proximity between them. Bibliographic coupling permits the identification of active research activities within a discipline or scientific field, and is a prospective method. In figure 1 document 1 and document 4 both cited document 2. Both documents share a same reference (document 2) and, therefore, share a similar thematic focus, provided that they share a minimum number of references. See figure 1 for a graphic representation of *bibliometric* techniques. In bibliographic coupling the focus is the *citing* documents (1 and 4), whereas in retrospective techniques the focus is on the *cited* documents (3 in direct citation or 3 and 2 in co-citation).

The citing documents sharing the same literature references are defined as similar, and as being involved in the same scholarly discourse. Besides, this method permits to incorporate to the debate current production not cited yet. For instance, suppose that the document 4 has itself not yet necessarily been cited, due to its recent publication. To incorporate document (4) in other methodologies such as co-citation would require waiting a long period of time until it is cited by other documents (Jarneving, 2007). In bibliographic coupling this new document (4, following the example) can be clustered into a thematic discourse or line of research, permitting thus to analyze emergent trends or shifts in that particular sub-fields of inquiry.

Bibliographic coupling refers to the number of references shared by at least two (citing texts) documents, with the greater the number of references (cited texts) directed to the same documents then the greater said to be the similarity between the citing documents. For instance, if citing papers A and B, both published in 2013, cite Marshall (1920), these two citing documents are presumed to be similar because they both refer to the ideas of clusters. Then, if both citing papers A and B also cite Cohen and Levinthal (1990) and Giuliani (2013), then both documents A and B are said to be similarly addressing not only clusters, but also the themes of absorptive capacity and network analysis or technology gatekeepers, respectively. In contrast, if citing documents C and D, published in 2013, also cite Marshall (1920), but then also cite Jacobs (1969), Frenken et al., (2007), and Boschma, Miranda and Navarro (2012), then this indicates that C and D are coupled to (i.e. have a similarity orientation to) the sub-field, or scholarly conversation of, related variety, a subject which remain interconnected yet distinct to previous A and B, forming a different scholar conversation within the wide theme of agglomerations. Documents A, B, C and D are the “citing” documents which are the unit of analysis in bibliographic coupling. Notice that these are not necessarily seminal documents, but represent emerging or current production in the field. The latter represents this paper’s purpose. On the contrary, their shared references (e.g. Cohen and Levinthal, 1990) are the “cited” documents and they are usually seminal contributions. Grouping “citing” documents within sub-fields of inquiry requires a minimum amount of same shared references (cited ones) or bibliographic threshold, as explained below. See figure 2 illustrating briefly the above example.

Figure 2 about here

As shown below, a pair of documents (or nodes) are grouped together as belonging to a sub-field of research only when they share a minimum number of references, usually no less than 10 (Glänzel and Thijs, 2012; Small, 2009), in order to secure consistency on the theme. Adherence to a minimum ensures a sufficient level of similarity (see Appendix). Those “citing” documents identified as reaching a sufficient level of similarity are defined as *core documents* belonging to a sub-group, a sub-field of inquiry, a hot research topic, or a scholarly discourse within a particular field. A core sub-group has high cohesiveness and dense interconnections between members, and weak connections to non-members within the field. Besides, statistically some parameters have also to show consistent statistically significance when identifying sub-fields. Thus, sub-groups

are distinctly distinguishable from the rest of the field. The members or documents of each sub-group or sub-field are highly cohesive and pursue their own research agenda independently from other discourses within the field (Vogel and Güttel, 2013).

3 Research design, data analysis and results

3.1 Empirical design

Our method is rooted in bibliometrics (Garfield, 1955; Shibata et al., 2008; Boyack and Klavans, 2010). Making sense and organizing a vast amount of literature requires making decisions in respect of the search criteria or key words utilized. In order to achieve a complete coverage of the literature and avoid a reference bias, we run keyword queries twice. The keyword queries try to identify all scholarly articles published in refereed journals. Using different key words allow a more comprehensive search. A first and initial broad search in the ISI Web of Knowledge was undertaken through the TOPIC criteria [those documents mentioning “industrial district*” OR “cluster*”], and by then further restricting the output to the *BUSINESS*, *ECONOMICS*, *ENVIRONMENTAL STUDIES*, *GEOGRAPHY*, *MANAGEMENT*, *PLANNING DEVELOPMENT* and *URBAN STUDIES* fields within the ISI Web of Knowledge. The dataset was then checked for authors who use the words “cluster*” or “industrial district*”. Then, after cleaning the dataset obtained³ we listed a sample composed of 3,955 documents (mostly articles) which included 202,732 cited references, covering the 1957-2013 period⁴. Every document received a numeric code in order that it could be identified throughout the study. Every document is a citing text and it contains cited (its references) ones. We focus on “citing” texts, albeit using their shared references or cited documents in order to classify and get sub-fields of inquiry. In the Appendix a list of the most cited references in that first search is listed (see table A-1 in Appendix).

³ For instance, we identified hundreds of documents which said they were applying “cluster (statistical) techniques”, while others made reference to clusters of star constellations.

⁴ We search for 1900-2014. The first paper meeting our requirements was in 1957. Interestingly, the search identified articles during the 1950s and 1960s, such as CRIBIER F. (1966), Industrial Districts of East-End of London, *Annales De Geographie*, 75: 208-209.; NAZAROV Y. (1962), The Problem of Organizing a Food-Supply Base for the Yeniseysk Industrial District, *Soviet Geography Review and Translation*, 3: 45-55.; WAGNER C. (1957), Planned Industrial Districts, *Journal of Geography*, 56: 129-132.; WEISS S., KAISER E. (1968), Quantitative Evaluation of Major Factors Influencing Urban Land Development in a Regional Cluster, *Ekistics*, 25: 338-342

3.2 Results from the first search

A first outcome of our bibliographic coupling analysis was the production of an aggregated matrix that displayed for all document pairs the co-occurrence of shared references in their bibliographies. This *similarity matrix* was then subsequently processed for detection of homogeneous groups, using multivariate statistical and network analysis for visualization. In social network analysis, communities are groups of nodes that are more intensively connected to one another than to the rest of the network; this serves to identify particularly cohesive sub-structures which represent specific subfields or research lines within the cluster literature. These communities of nodes (citing documents) share references around a core concept or topic within the field of research, as explained above.

Starting with the matrix that shows the frequency with which pairs of documents share references, then *partial clustering algorithm* technique on frequency counts is applied. This serves to cluster progressively the pairs of papers sharing references (Persson, 1994), and thus the different thematic discourses (documents sharing references) that are identified are individually labeled. A minimum threshold of the sharing of 16 references is fixed and, after applying partial clustering technique, results categorized 129 documents into six groups. Then, for visualization purposes we use network analysis. Figure 3 below presents the sub-fields identified for the period 1957-2013. In the network obtained through bibliographic coupling more than 3% of the total documents are included, a value well above the minimum 1% recommended by the literature⁵ (e.g. Glänzel and Thijs, 2012). All citing documents which did not show similarity between each other by citing a threshold of references were not coupled. Then, we proceed to read and review content in all coupled documents. See figure 3 and table 1 for a summary of results. In table 1 we analyzed also the cited (shared) references in the 129 citing documents, in order to understand each group more comprehensively. Table 2 lists all articles by thematic groups showed in Figure 3. See table1 and 2.

Insert figure 3 here

Insert table 1 here

⁵ Following Glänzel & Czerwon (1996, 1995), common studies represent at least 1% of the initial population of documents. In our study, we used 3.38% (threshold of 16 shared references) in our sample, represented in the network of bibliographic coupling in the figure 3.

Insert table 2 here

In the network of bibliographic coupling presented in figure 3 we have identified six groups currently focused on particular sub-fields in the cluster literature. These six groups are shown again in table 1, together with the proposed thematic titles for the discourses they are focused on. Included in table 1 are the symbols the groups are identified by in figure 3, along cited references, journals where the citing documents are published and other additional information.

Thanks to the bibliographic coupling technique, the network presented in figure 3 for the most part provides papers published in the 2000s, showing the current state-of-the-art and emergent yet consolidated sub-fields. We insist on the fact that the documents visualized only represent current or emerging scholar conversations, not constituting seminal or foundational works *per se*. These groups are analyzed as follows.

Group 1 has within it those works related to the *evolutionary economic geography* discourse (e.g. Frenken and Boschma, 2007; Martin and Sunley, 2006; Boschma and Frenken, 2006), including cluster evolution and path dependency (Mackinnon et al., 2009; Henning et al., 2013; Maskell and Malmberg, 2007; Menzel and Fornahl, 2010). Textual analysis found that key words or phrases used by the group included, for example: “evolution/evolutionary”, “path dependence” or “path creation”. This group focuses on describing evolutionary economic geography, considering aspects such as the co-evolution of firms, industries, networks (Ter Wal and Boschma, 2011) and clusters in space (Menzel and Fornahl, 2010); the debate on related variety (Neffke et al., 2011); and geographical explanations for path dependency or myopia (Martin, 2010; Martin and Sunley, 2006; Maskell and Malmberg, 2007, among others). As explained below, the specific topics within it cannot be captured only by using our search strategy (keyword = industrial district* and cluster*) in the ISI Web of Knowledge, provided that multiple sub-topics are represented within the *evolutionary economic geography* discourse, as indicated by Boschma and Frenken (2011). We extend this group in Section 4.

A second sub-field, Group, 2, concerns itself with the theme of global pipelines or external linkages, connecting clusters to the outside world and explicitly recognizing that external linkages, beyond local buzz, are also development mechanisms. In this line of thought, this group has been particularly influenced by Bathelt et al.’s (2004) seminal work on the definitions of *global pipelines* and that of temporary clusters in global

pipelines (Maskell et al., 2006). The most cited papers are indeed Bathelt et al., (2004), as well as Malmberg and Maskell (2002). This emergent and highly cohesive sub-group focuses on revisiting localized (as opposed to national or international level) learning (Lorenzen, 2007), and locations as places for knowledge creation (Malmberg and Maskell, 2002). This group is supported by management and economic geography-based literature on the cluster topic that recognizes the benefits from openness in clusters⁶.

Group 3 is focused on the topic of cluster taxonomies, that is, on the subject of defining ideal types or taxonomies of spatial industrial clustering. Core papers highlight the different types of clusters and other related conceptualizations (e.g. Gordon and McCann, 2000; Iammarino and McCann, 2006). The most cited paper is that of Gordon and McCann (2000). This is smallest group in terms of number of documents. It is also the one that seems to be more static.

A fourth group, Group 4, has the thematic title “innovation and firm analysis” and is concerned with innovation-related studies. In this group management/business journals, concepts and even authors are highly represented in the cited references listed in citing documents. In this numerous and heterogeneous group, there is an emphasis on empirical research on the role of firms in clusters and industrial districts and their strategies based on leveraging localization economies. Common concepts referred to include: capabilities, strategy (e.g. Belussi and Sedita, 2009; Belussi et al., 2008; Camison, 2004; Camisón and Villar-Lopez, 2012) and knowledge (Malecki, 2010ab); absorptive capacity (Hervas-Oliver and Albors-Garrigos, 2009); and innovation and/or firm performance (e.g. Hervas-Oliver et al., 2012; Molina-Morales and Martínez-Fernandez, 2003). Most of the shared references of this group are for papers concerned with managerial capabilities and absorptive capacity (Cohen and Levinthal, 1990). Overall, this group encompasses a diversity of topics based on innovation studies and using a managerial approach by which the core unit of analysis are cluster firms, their strategies and capabilities to use and exploit external (to the firm) knowledge. Besides, most of those scholars are based at the intersection between economic geography and management.

⁶ In line with this idea of clusters opening to new knowledge, Markusen (1985) states that inward-looking orientations impact negatively on cluster performance, whereas openness of networks to new skills, knowledge and firms have positive influences (Porter, 1998; Bresnahan et al., 2001; Romanelli, E., Khessina, O.M., 2005; Eisingerich et al., 2010). Besides, from the management perspective Arikan's (2009) framework, based on Rosenkopf and Almeida (2003), also posits that the more cluster firms engage in knowledge exchanges with outside entities, the stronger the creation of new knowledge in clusters becomes.

Despite addressing micro-level and firm-based concepts, regional-based journals are prominent in this group, such as *European Planning Studies*, *Entrepreneurship and Regional Development* or *Regional Studies*, among others.

Group 5 has as its central theme that of inter-firm networks, social capital and flows of knowledge within networks and clusters, again being mainly based at the firm-level and using extensively management concepts. In this group, the literature focuses on networks and their evolution, using a spatial dimension from the economic geography (e.g. Gluckler, 2007) together with a management perspective in which joint effects of geographic proximity and network position, concurrently, are analyzed and their effects on organizational innovation (Whittington, Owen-Smith and Powell, 2009). Several disciplines address this line of research. For example, a *managerial perspective* addresses the role of social capital in networks (e.g. Inkpen and Tsang, 2005), network evolution ([Rosenkopf](#) and Padula, 2008), networks of innovation (Belussi, Samarra and Sedita, 2008) and knowledge creation in clusters (Arikan, 2009). Besides, a regional-based approach refers to subjects such as social capital in regions and clusters (Malecki, 2012) or knowledge evolution (Huggins, 2008) concepts. Again, this group has strong connections with the management literature, journals and authors, in a similar way to that of Group 4, “innovation and firm analysis”. In the Group 5 management and business/innovation journals (e.g. *Organization Science*, *Academy of Management Review*, *Administrative Science Quarterly*, *Research Policy*, *Technovation*, *Journal of Business Research*, *Innovation-Management Policy & Practice*) co-exist with those economic geography dedicated, such as *Journal of Economic Geography*, *Regional Studies* or *Entrepreneurship and Regional Development*, among others. Besides, empirical citing documents utilize extensively network analysis methodology. In this group it is also observed profound theoretical reviews of social capital, indistinctively in management (e.g. Inkpen & Tsang, 2005, Arikan and Schilling, 2011) and economic geography/regional studies journals (e.g. Malecki, 2012). Knowledge creation in clusters (Arikan, 2009) and cluster functioning and performance, using social network theory for depicting innovation in clusters (Eisingerich et al., 2010), are also present in this group.

Lastly, Group 6 shows a common interest in the emerging theme of spatial network analysis as a methodology for investigating clusters, similar to that in Group 5, including knowledge exchange among cluster firms (Giuliani, 2007; Giuliani, 2013) and the role of technology gatekeepers (TGs) and their positions in networks (e.g. Morrison et al.,

2013; Morrison, 2008; Kesidou and Snijders, 2012). This TGs and network-position analysis group seeks to explore the structural properties of networks and the circulation of innovation related knowledge at the cluster firm level, stressing the role of TGs. In this group the journals are mainly those from the regional studies/economic geography and present a clearer tendency to position debate in understanding spatial clusters as complex set of networks in which central positions are occupied by TGs (Allen, 1977) restricted to their meaning in the context of cluster literature (see Bell and Albu, 1999 and Giuliani and Bell 2005).

It is particularly worth highlighting that the groups 4, 5 and 6 are highly connected to one another, but less so to group 3, and even less so to groups 1 and 2. In fact, as observed in the Figure 1, Belussi and Sedita (2012) act as a connector of the three groups. Moreover groups 4, 5 and 6 tend to be published in different journals than groups 1, 2 and 3. As above mentioned, Groups 4,5 and 6 are not only to be found in major journals such as *European Planning Studies* and *Regional Studies*, but also have a very prominent presence in managerial journals, such as *Organization Science* and *Academy of Management Review*, and in publications devoted to technology and innovation, such as *Research Policy* or *Technovation*. In contrast, groups 1, 2 and 3 are more visible in economic geography and regionally focused journals, such as *Economic Geography*, *Journal of Economic Geography*, *Regional Studies* or *Environment and Planning A*, among many others, and draw less on managerial concepts. See table 1 for a brief synthesis. For the sake of brevity, more results available upon request.

In short, the careful analysis of bibliographic networks has clearly revealed the existence of a core sub-network of sub-groups: 4 (innovation and firm analysis), 5 (inter-firm networks, social capital and flows of knowledge) and 6 (network analysis and technology gatekeepers). This sub-network is highly influenced by classic managerial concepts, such as *gatekeepers*, *absorptive capacity*, *firm strategy* or *knowledge* but also by traditional cluster/economic geography ideas such as *social capital*, or other topics shared in the last years by both management and economic geography perspectives, like *network analysis* and *networks of innovation*. Overall, those particular scholar conversations addressing clusters are highly influenced by management and innovation perspectives and approaches. Besides, it has also been observed that there are two emergent dynamic and prolific sub-fields, addressed by groups 1 (evolutionary economic geography) and 2 (global pipelines), that are moving the cluster discourse beyond the

classical topics observed in the traditional core of the literature. It is important to stress the fact that some sub-groups can also overlap in particular topics but each sub-field pursuit rather different research agendas. For instance, groups 4 (innovation and firm analysis), 5 (inter-firm networks, social capital and flows of knowledge) and 6 (network analysis and gatekeepers) all share, in general, the focus on analyzing firms or plants, as unit or level of study, in clusters. Lastly, of particular interest is the movement of the management approach and its analysis at the firm level into the economic geography field, as can be seen especially in the cases of group 4 (innovation and firm analysis) and 5 (inter-firm networks and social capital). Of further note is the increasing popularity of methodologies connected to network analysis and statistics, found in group 5 and 6.

3.3 Additional insights

It should be pointed out that table 1 and figure 3 does not include key past or foundational works as citing documents, what might be referred to as seminal founders, nor incorporate traditional seminal works (such as Saxenian, 1994 or Becattini, 1990, among many others showed in Table A-1 in the Appendix). The reason for that is that bibliographic coupling does not search into the retrospective literature but current or emergent production: its tracks current (ongoing production) scholarly discourses solely focus on clusters/industrial districts and not analyzes historic intellectual foundations, as Cruz and Teixeira (2010) or Lazzereti et al., (2014) do. For this reason, our paper's results differ from those. An interesting but different point, however, is that these discourses are in fact rooted (as shown in the shared references in table 1) in the seminal works of each sub-field, as explained further below. Other related debates (and their foundational works) such as *regional innovation systems* or *learning regions* are not showed because they are out of this paper's scope⁷ and they cannot be found using the mentioned search strategy based on those particular keywords. This does not mean they are not important for the regional studies or the economic geography, but we follow the above mentioned scope based on clusters and industrial districts. See figure A-1 in the Appendix.

Figure A-2 in the Appendix shows the growth of the cluster/industrial district field according to the number of publications coming out each year, over the period 1957-

⁷ According to ISI Web of Knowledge, Morgan, Gertler, Grabher, Cooke, Maskell, Malmberg, Florida, Asheim or Pinch, among others, are seminal authors in that conversation.

2013. Growth has been impressively prominent since the beginning of the 1990s. Only in 2011 more than 400 documents addressing industrial districts and clusters are observed. See figure A-2 in the Appendix.

The 3,995 articles from the first search were published in multiple journals. For the sake of brevity, we show the first twenty academic journals. The distribution among the journals is, however, quite skewed. Taking at least one hundred papers published as a cut-off point, we are left with only four journals: *European Planning Studies*, *Regional Studies*, *Urban Studies and Environment and Planning A*. Taking at least seventy papers published as a cut-off point, we are left with five, additional to the previous ones, journals. These new ones are *Research Policy*, *International Journal of Technology Management*, *Entrepreneurship and Regional Development*, *Technological Forecasting and Social Change* and *Journal of Economic Geography*. As observed, those publishing at least one hundred, along with *Journal of Economic Geography*, are considered as specialty or niche journals (e.g. *European Planning Studies*, *Journal of Economic Geography*), whereas the rest are multidisciplinary journals devoted not only to clusters but to innovation, entrepreneurship or technology management. This fact is a good indication of the cross-disciplinary content of the field and the diversification into different conversations or communities. See figure A-3 in the Appendix.

The final 129 citing documents from the bibliographic coupling exercise were published in forty academic journals, showing a slightly different distribution of journals, in respect of figure A-3. See figure A-4 in the Appendix. As observed in figure A-4, the top-publishing ten journals account for 70% of the citing documents. With the exception of *Entrepreneurship and Regional Development*, *Technovation* and *Research Policy*, all the top-publishing journals are considered to be specialty or niche ones. The rest of journals are mixed, with specialty ones mostly focus on broad regional studies (e.g. *Papers in Regional Science*), management and business ones (e.g. *Journal of Management Studies*, *Academy of Management Review*) or innovation/technology ones (e.g. *Industry and Innovation*, *Industrial and Corporate Change*). Findings from Figure A-3 and A-4 show how fragmented is the focal literature. For the sake of brevity, more results available upon request.

3.4 Empirical extension: second search

The initial search strategy [industrial district* and cluster*], however, represents a limitation in itself, provided that there can be more documents in the literature addressing clusters or industrial districts beyond that particular search strategy or keyword query. With the purpose to detect emergent topics or current research lines within the cluster/industrial district topic, not previously captured in our initial search, and with the purpose to triangulate results, a new search based on a different keyword query complements the previous one and assures not to leave additional documents out.

In order to achieve a more complete coverage of the potential literature around industrial district and cluster topics, a second search in the ISI Web of Knowledge⁸ was undertaken through the TOPIC criteria [keyword = (*agglomeration**)], restricting documents within BUSINESS, ECONOMICS, ENVIRONMENTAL STUDIES, GEOGRAPHY, MANAGEMENT, PLANNING DEVELOPMENT and URBAN STUDIES fields within the ISI Web of Knowledge, obtaining 2,419 citing documents. The most shared references in those citing documents from the second search are presented in table A-5. New documents were analyzed, provided that our paper's scope is restricted to industrial districts and clusters. Using a similar methodological criteria and statistics, new documents are clustered into groups and their content was carefully revised. In this second search, groups which were already represented in the first search and new ones, not previously showed in the initial search, were identified. A fuzzy set of different groups was observed. These new groups mostly addressed economics of agglomerations, along with other management and urban strands. In the table A-5 (see Appendix) the most cited (shared references) documents in the 2,419 works, that is, the references available in the new set of documents, are those based on Krugman, Glaeser, Venables, Jaffe, etc., with very active journals such as *Journal of Political Economy*, *Quarterly Journal of Economics* or the *American Economic Review*. After a detailed identification of documents, a leading group addressing *economics of agglomerations* stands out, with works from Puga, Ottaviano, Fujita, Krugman, among others. Obviously, this conversation was considered to be out of our scope⁹. The rest of groups were not related

⁸ See Lazzeretti et al., (2014) for the limitations of the ISI Web of Knowledge and the ISI Web of Knowledge itself.

⁹ In this group the journals are dedicated to the development of theory and methods in spatial economics and the economics of agglomeration, such as *Journal of Regional Science*, *Spatial Economic Analysis*,

to clusters or industrial districts¹⁰, as they referred to urban economics or other different strands from those of clusters/industrial district topics¹¹. There are two conversations from the *agglomeration* search, however, which content could be included in our paper's scope, provided that the specific lines of study address clusters/industrial districts and can also be interpreted within Group 1, suiting properly in our paper's scope. These two new topics were highly connected to Group 1 *Evolutionary economic geography*, referring to *spinoffs* and *agglomeration* and *firm performance*. Thus, and with the purpose to refine the search and address these new conversations, we extend the second search, addressing spinoffs and firm performance [keyword= (agglomeration* AND spin-off*/spinoff*) and (agglomeration* AND performance*)]. Following previous methodology, the network was constructed and the conversations' content analyzed.

Insert figure 4 here

Insert figure 5 here

Insert table 3 here

As showed in figure 4 and 5, referred to spinoffs, the new documents address conceptually those topics based on *evolution* within Group 1, providing additional insight of specific debates within that sub-field of inquiry, as Boschma and Frenken (2011) have suggested: from an evolutionary perspective, clusters are analyzed by tracing regional entry and exit patterns over time through the study of spinoffs. Results for the spinoffs topic reduced the original set to 24 citing documents (figure 4), well integrated into one highly cohesive group, while agglomeration and firm performance topic (figure 5) showed 221 documents integrated in two final sub-fields of 27 and 14 documents. See figure 4 and 5. Besides, table 3 lists all documents from figures 4 and 5.

The interpretation of the spinoff debate is really interesting. Generally, Boschma, Wenting, Buenstorf and Klepper, among others, lead this emerging conversation. We

Papers in Regional Science or Regional Science and Urban Economics, with a minor presence of others such as Regional Studies, or Journal of Economic Geography. Leading authors in the conversation are, among others, Puga or Fujita. Most cited and shared references in this sub-group are: Krugman P, 1991, V99, P483, J Polit Econ; Krugman P., 1991, Geography Trade; Glaeser EL, 1992, V100, P1126, J Polit Econ; Venables, 1999, Spatial Ec Cities Re; Jacobs J., 1969, Ec Cities; Marshall A, 1920, Principles Ec; Jaffe AB, 1993, V108, P577, Q J Econ

¹⁰ There is a small group of 11 papers addressing regional innovation systems, led by Todtling, Belussi or Doloreux, citing intensively at seminal authors like Cooke, Philip or Bjorn Asheim. Nevertheless, not all of them fit in our scope of clusters and industrial districts.

¹¹ For the sake of brevity, more results available upon request.

observe in figure 4 an integration of literatures based on management/economics (*Management Science, Journal of Evolutionary Economics*, among others) and economic geography (*Regional Studies, Journal of Economic Geography*, among others). In respect of the content of the conversation, scholars have been elaborating *how* clusters are constructed through firm entry and exit, analysing differing types of new entrants (such as start-ups, diversifiers and spinoffs), and researching survival rates (e.g. Boschma and Hartog, 2014; Costa and Baptista, 2012; Klepper, 2011; Buenstorf and Klepper, 2009; Wenting, 2008; Klepper, 2007; Boschma and Wenting, 2007). Spinoffs are driven by a process of organizational reproduction and heredity, and successful firms have higher spinoff rates and their spinoffs outperform competitors. This is the Klepper's assumption. Most of these studies have shed light on the debate between the effects of *spinoffs*, lead by Klepper and colleagues, versus those of *agglomeration*, explained by firm interactions, in explaining cluster formation and evolution. Despite the fact that the two perspectives overlap, and that the two strands can be reconciled (e.g. Costa and Baptista, 2012; Boschma and Wenting, 2007) by virtue of the fact that spinoffs have been found to be important in the first stages of a cluster's evolution while the effects of agglomeration play a key role in more advanced stages, there remains unresolved tension between the perspectives which calls for further empirical research (e.g. Costa and Baptista, 2012; Boschma and Wenting, 2007). Most cited references, shared by the group, are: Klepper (2007:2005) or Agarwal et al., (2004), among others.

Then, as observed in figure 5, addressing agglomerations and performance, the first subgroup, at the top side, is composed of 27 documents and represents the agglomeration and firm performance debate or how firms access and take advantage of MAR agglomerations, as Boschma and Frenken (2011) have stated, following an approach based on management (journals such as *Academy of Management Journal, Strategic Management Journal, Journal of Business Venturing, Administrative Science Quarterly*, among others) and, to less extent, on economic geography and innovation studies perspectives (*Industry and Innovation, Research Policy, Journal of Economic Geography, Regional Studies*). Marshall (1920), Shaver and Flyer (2000), Porter (1990), Jaffe et al., (1993) and Audrestch and Feldman (1996), among others, were the most cited and shared references in the group. At the bottom side of the figure 5, the remaining 14 documents offer an economic geography/regional studies/economics dedicated subgroup of inquiry, with seminal authors like Malmberg, Potter, Eriksson or Glasmeier,

published in economic geography dedicated journals (*Journal of Economic Geography*, *Environment and Planning A*, *Papers in Regional Science*, among others). Glaeser et al., (1992), Jaffe et al, (1993), Krugman (1991), Storper (1989), among others, were the most shared references in those citing documents.

In terms of content, the management approach in figure 5 presents two interrelated and inconclusive debates. Despite substantial amounts of work on the relationship between localization externalities and firm performance, important issues (e.g. Baum and Mezias, 1992; McEvily and Zaheer, 1999; Decarolis and Deeds, 1999; Sorenson and Audia, 2000; Kenney, 2000; Owen-Smith and Powell, 2004; McEvily and Marcus, 2005; Bell, 2005; Gilbert et al., 2008; Whittington et al., 2009; McCann and Folta, 2011) remain unresolved and is far from conclusive. There are studies which have found localization has no effect or even negative effects on performance (e.g. Baum and Mezias, 1992; Sorenson and Audia, 2000, Stuart and Sorenson, 2003; Gilbert et al., 2008; Kukalis, 2010), while others have found the link to be positive (Decarolis and Deeds, 1999; Bell, 2005; Folta, Cooper and Baik, 2006; McCann and Folta, 2011). Another unresolved discussion has focussed on the potential asymmetric benefits for located firms. While it is agreed that not all firms benefit equally from being located in an agglomeration (e.g. Baum and Haveman, 1997; Shaver and Flyer, 2000; Chung and Kalnis, 2001; Canina et al., 2005; McCann and Folta, 2011; Rigby and Brown, 2013; Pe´er and Keil, 2013), some studies have concluded that knowledge-rich firms are the main beneficiaries (e.g. McCann and Folta, 2011), while others say that on the contrary it is knowledge-poor firms which gain the most (Shaver and Flyer, 2000). Finally, the economic geography conversation in figure 5, discusses the impact of labour market-induced externalities on firm performance (Eriksson and Lindgren, 2009) or impact of spillovers and knowledge flows on the firms' performance (Eriksson, 2011; Boschma and Weterings, 2005). Besides, theoretical debates addressing MAR and Jacobs externalities (Beaudry and Schiffauerova, 2009) or localization externalities (Malmberg and Maskell, 1999) are observed. In this sub-field of research there is a more ample consensus, vis-à-vis its management-based counterpart, about the positive effect of localization on a firm's performance.

Finally, it is worth to point out the differences between the first and the second search. In the first search (industrial district and clusters) the most cited or shared references of the 3,995 documents analyzed, are Porter, Bathelt, Nelson, Saxenian, Marshall, Martin,

Markusen and even Cohen's and Levintahl's absorptive capacity, among others (see table A-1 in the Appendix). In the second search, however, Krugman, Glaeser, Venables, Ottaviano or Puga, among many others (see table A-5 in the Appendix) are the most cited. Overall, there is a high coincidence of cited (shared references) documents in the citing documents from both searches, albeit the mentioned differences, as they constitute the fundamentals of our literature.

4 Conclusion

Cluster and industrial district literature remains rather fragmented across different disciplines and topics. This paper's objective has consisted of identifying emerging topics or lines of inquiry in the literature in order to provide a better understanding of the current state of the field. In doing so, this paper has sought to introduce to cluster scholars the method of prospective *bibliographic coupling* (Kessler, 1963). This approach can complement the traditional method of retrospective *co-citation* analysis, using bibliographic coupling as a way of evaluating likely emergent research in the field of interest. It has done this by analyzing current research communities and emerging perspectives to identify areas of thematic expansion. To avoid a reference bias, this paper has utilized an accessible database (Web of Science) which permits other researchers to replicate or extend the analysis. This is of paramount importance for the development of the cluster conversation. This paper has limited its scope to industrial districts and clusters. Conclusions are, therefore, contextualized into that particular scope.

More specifically, this analysis contributes to the field of clusters by identifying research lines that indicate current trends towards further differentiation or diversification of the cluster field research agenda. Within the cluster field there exists theoretical and conceptual *diversification*, and it is clear from the bibliographic coupling evidence we have provided that there exist *differing discourses and topic-based communities of practice* focused on particular topics, methods and intellectual foundations within the field of study. In particular, the principal network of bibliographic coupling and its complementary ones demonstrated in the study reveal current trends of the literature and/or emergent topics in the field of study. In conceptual terms, it has been shown there is a high diversity of sub-topics and conceptual approaches within the field: evolutionary economic geography, global pipelines, cluster taxonomies, innovation and firm level

analysis, inter-firm networks and social capital, and network analysis and technology gatekeepers. This results does not mean that there is a saturation point. Other related conversations can co-exist even across those ones, such as policymaking for clusters. Searching more sub-fields would require using multiple keyword queries.

This study has achieved a picture of the current state of the field by using a new methodology that goes beyond traditional reviews which focus only on backward-looking co-citation analysis with the aim of identifying the subject's past history and its intellectual foundations. The use of bibliometric analysis enables researchers to reveal current lines of research and emergent priorities in the cluster field.

Overall, the following key points stand out: (i) there are distinct yet interconnected conversations shaping the current evolution of the cluster literature across different disciplines; (ii) the fertile diversification of the literature is represented in, at least, six specific sub-fields of research or lines of inquiry: each conversation presents its own shared (cited) references, is published in specific journals and addresses particular topics, constructs and approaches within the focal cluster topic; (iii) it is specially relevant the prominent intersection of the management¹² discipline, with its journals, topics and approaches, with that of economic geography/regional studies; (iv) a remarkable adoption of managerial constructs and concepts by the economic geography community (e.g. absorptive capacity, technology gatekeepers¹³) is observed; (v) an increasing interest of the micro-unit of analysis (cluster firms) as a focal point in some of the conversations (especially Group 4, 5 and 6), complementing thus the *meso-unit* of analysis (more typical in Group 1, 2 or 3); (vi) the consolidation of statistical methodologies based on (spatial) *network analysis* (especially in Groups 6 and 5).

Bibliometric coupling utilizes a prospective lens which complements other approaches carried out before based on co-citation analysis to obtain a picture of the origin and development of the cluster concept (Cruz and Teixeira, 2010; Lazzeretti et al., 2014). Despite the different methodological approaches employed, our work agrees with the observations of Lazzeretti et al., (2014) about a trend towards diversification within the field of study and a relevant *cross-disciplinary nature* of the cluster concept, highlighting

¹² Management in a broad sense: referring to technology strategy, management of technology (MOT), innovation, organizational learning, etc.

¹³ Cohen and Levintahl (1990) and Allen (1977), respectively are seminal works in management whose concepts are now vastly used in economic geography mostly popularized by Bell, Giuliani or Asheim, among others.

in particular the significant roles of both *management* and *innovation* perspectives in the field of clusters. Besides, our results are partially coincident in those by Cruz and Teixeira (2010: 1267) research themes, albeit the latter is restricted only to a particular journal, *Regional Studies*. In all, our results complement other results based on retrospective methods.

This article is not free from limitations. This paper is not covering all literature within regional studies and economic geography but focused solely on a narrow concept: clusters and industrial districts in a *cross-disciplinary* way. First, the selection of a database (Web of Science) and key words using English might exclude important works written, or listed in journals, or indexed in a different language. Second, the process of citation can be motivated by self-legitimization strategies or other purposes (see Bornmann and Daniel, 2008) rather than for purposes of drawing on prior knowledge. Bibliometrics in general, and specifically in our paper, cannot capture authors' reasons for citation. Third, and following Vogel and Güttel (2013), works providing longer bibliographies tend to establish a higher network centrality when compared to those employing fewer references. Fourth, the particular threshold chosen for the minimum number of shared references, the distance measure, and the statistical multivariate method selected for clustering items (documents) all influence the number of groups selected and final results and conclusions. Fifth, our own "qualitative" interpretation of the empirical results around sub-groups also might influence the conclusions of this paper. Finally, this paper does not address exhaustively all possible conversations about clusters, as above mentioned, due to the wide spectrum of the seminal topic itself and the search strategies limitation by using specific key words. The search strategies utilized in this work may prevent from finding different conversations, as showed in the new subfields found in the second search.

In all, it should be noted that despite the identification of the various sub-fields, there might yet still exist important content variety, or sub-fields, within each sub-group, as showed in the second search showed in figure 4 and 5. For instance, and following Boschma and Frenken (2011), other discourses within evolutionary geographies are those such as the type of agglomeration externalities variation according to the stage of the product lifecycle in an industry (Potter and Watts, 2010), the channels through which spillovers are expected to occur (Almeida and Kogut, 1999) or the role of *institutions* in evolutionary economic geography (Boschma and Frenken, 2006). Different search

strategies and triangulation of results among them can further improve our knowledge on those specific conversations or bring other conversations onto the stage. This paper, however, offers a comprehensive picture of the ongoing debate on industrial districts and clusters, along with a methodology for expanding and researching on any specific conversation within the field of analysis. We expect that cluster researchers can benefit from this new tool.

In the future new studies can improve our understanding of the cluster field. Future bibliometric and other studies could explore in depth each of these sub-fields and their content in order to provide a complete narrative of the state of the art and the topics and research lines within each group. Another useful line of research could be to look at potential conceptual and research relationships between, on the one hand, perspectives on clusters or industrial districts and, on the other hand, work on regional innovation systems. Then, a different but key exercise would be to apply bibliographic coupling to authors and journals in order to identify schools of thought and communities of scholars connected to topics within the cluster field. Finally, in order to track the evolution of the sub-fields identified in this study further analysis will be required to test for resilience or fragmentation over time.

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Tables and figures

Figure 1. Graphic representation of bibliometric methods

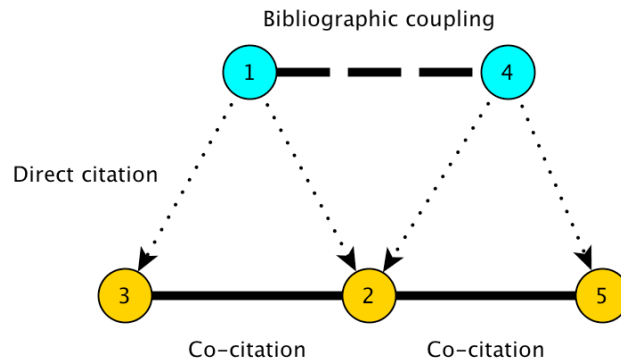
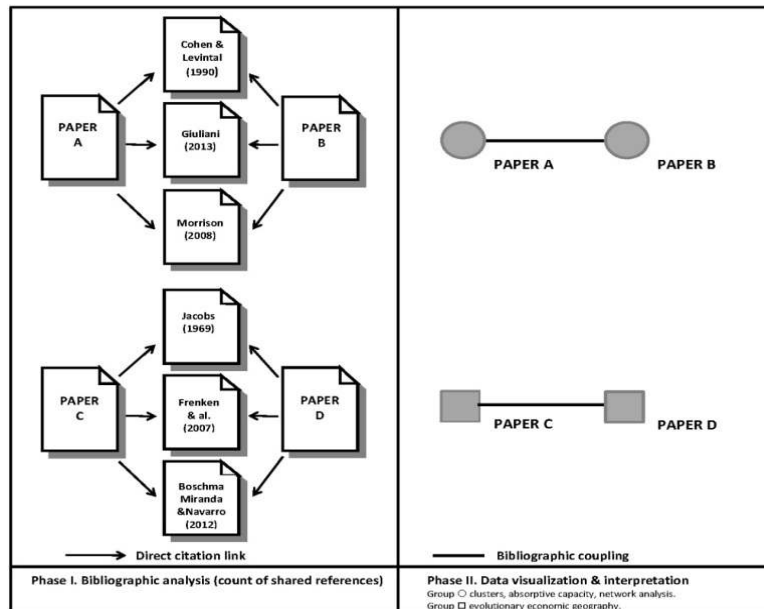
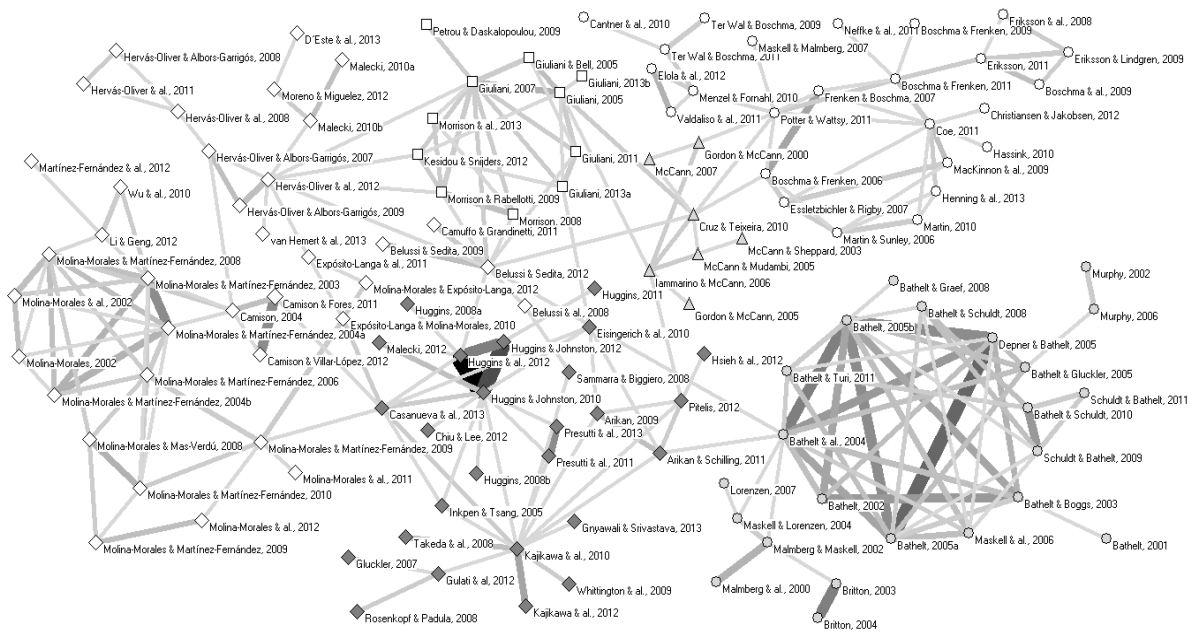


Figure 2. Example of bibliographic coupling



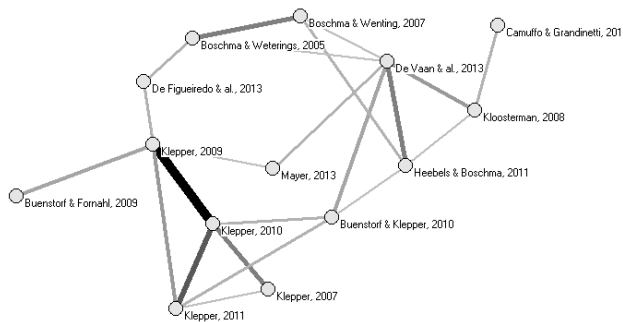
Source: own. This is only an example. Notice that the formation of a group requires a minimum number of shared references.

Figure 3. Networks of bibliographic coupling (frequency counts, 1957-2013)



Source: authors' elaborations based on ISI database. The thickness of the lines reflects the frequency of references shared by a pair of nodes (documents). The symbols identify particular sub-groups. The names attached to each node refer to first and second authors and the year of publication.

Figure 4. Networks of bibliographic coupling (frequency counts, 1957-2013): agglomerations and spinoffs



Source: authors' elaborations based on ISI database. The thickness of the lines reflects the frequency of references shared by a pair of nodes (documents). The names attached to each node refer to first and second authors and the year of publication.

Figure 5. Networks of bibliographic coupling (frequency counts, 1957-2013): agglomerations and firm performance



Source: authors' elaborations based on ISI database. The thickness of the lines reflects the frequency of references shared by a pair of nodes (documents). The names attached to each node refer to first and second authors and the year of publication.

Table 1. Groups of citing documents, thematic titles, and symbols based on the bibliographic coupling from the first search: 1957-2013

Group	Symbol	Thematic titles for the scholarly discourses	Most references shared in each group (cited references in the sub-fields; hierarchical order*)	Academic Approach based on citing documents and shared references	Type of academic journals in each scholar conversation (where citing documents are published)	Most cited 50 references in the first search from the 129 final documents (hierarchical order*, restricted to the output in the six groups identified)
1	○	Evolutionary economic geography E.g. Boschma and Frenken, 2011	Martin R, 2006, V6, P395, J Econ Geogr Boschma RA, 2006, V6, P273, J Econ Geogr Maskell P, 2007, V7, P603, J Econ Geogr Nelson R R, 1982, Evolutionary Theory Bathelt H, 2004, V28, P31, Prog Hum Geogr Jacobs J, 1969, Ec Cities Storper M, 1989, Capitalist Imperativ Frenken K, 2007, V41, P685, Reg Stud Grabher G, 1993, P255, Embedded Firm Socioe Boschma RA, 2004, V38, P1001, Reg Stud Boschma RA, 2007, V16, P213, Ind Corp Change Boschma RA, 1999, V9, P411, J Evol Econ	Evolutionary economic geography and regional studies based	Economic Geography, Journal of Economic Geography, Regional Studies, among others.	Cohen WM, 1990, V35, P128, Admin Sci Quart Bathelt H, 2004, V28, P31, Prog Hum Geogr Porter M, 1990, Competitive Advantag Maskell P, 1999, V23, P167, Cambridge J Econ Nelson R R, 1982, Evolutionary Theory Granovetter M, 1985, V91, P481, Am J Sociol Mcevely B, 1999, V20, P1133, Strategic Manage J Maskell P, 2001, V10, P921, Ind Corp Change Uzzi B, 1997, V42, P35, Admin Sci Quart GranovetMs, 1973, V78, P1360, Am J Sociol Giuliani E, 2005, V34, P47, Res Policy Uzzi B, 1996, V61, P674, Am Sociol Rev Storper M, 2004, V4, P351, J Econ Geogr Malmberg A, 2002, V34, P429, Environ Plann A Lawson C, 1999, V33, P305, Reg Stud Becattini G, 1990, P37, Ind Districts Interf Lawson C, 1999, V23, P151, Camb J Econ Boschma RA, 2005, V39, P61, Reg Stud Jaffe AB, 1993, V108, P577, Q J Econ Storper M, 1997, Regional World Terri Marshall A, 1920, Principles Ec Saxenian A, 1994, Regional Advantage C Capello R, 1999, V33, P353, Reg Stud Boschma RA, 2006, V6, P273, J Econ Geogr Martin R, 2003, V3, P5, J Econ Geogr
2	●	Global pipelines E.g. Bathelt et al., 2004	Storper M, 1997, Regional World Terri Grabher G, 2002, V36, P205, Reg Stud Maskell P, 2001, V10, P921, Ind Corp Change Maskell P, 1999, V23, P167, Cambridge J Econ Uzzi B, 1997, V42, P35, Admin Sci Quart Storper M, 2004, V4, P351, J Econ Geogr Bathelt H, 2004, V28, P31, Prog Hum Geogr Scott A, 1988, New Ind Spaces Flexi Porter M, 1990, Competitive Advantag Granovetter M, 1985, V91, P481, Am J Sociol Malmberg A, 2002, V34, P429, Environ Plann A Maskell P, 1999, V6, P9, Eur Urban Reg Stud	Economic geography and regional studies based	Journal of Economic Geography, Progress in Human Geography, Environment and Planning A, among others	
3	△	Cluster taxonomies E.g. Gordon and McCann, 2000	GranovetMs, 1973, V78, P1360, Am J Sociol Gordon IR, 2000, V37, P513, Urban Stud Castells M, 1994, Technopoles World Ma Nelson R R, 1982, Evolutionary Theory Williamson O, 1975, Markets Hierarchies Scott AJ, 1988, New Ind Spaces Porter M, 1990, Competitive Advantag Jaffe AB, 1993, V108, P577, Q J Econ Vernon R, 1966, V80, P190, Q J Econ	Economic geography and regional studies based	Urban Studies, Research Policy, among others	
			Mcevely B, 1999, V20, P1133, Strategic Manage J			

4	◇	Innovation and firm analysis E.g. Belussi and Sedita, 2009	Becattini G, 1990, P37, Ind Districts Interf Cohen WM, 1990, V35, P128, Admin Sci Quart Maskell P, 1999, V23, P167, Cambridge J Econ Uzzi B, 1996, V61, P674, Am Sociol Rev Lazerson M H, 1999, V8, P235, Ind Corp Change Foss NJ, 1996, V3, P1, J Ind Studies Uzzi B, 1997, V42, P35, Admin Sci Quart Porter M, 1990, Competitive Advantag Pouder R, 1996, V21, P1192, Acad Manage Rev Lawson C, 1999, V23, P151, Camb J Econ Granovetter M, 1985, V91, P481, Am J Sociol Decarolis DM, 1999, V20, P953, Strategic Manage J Glasmeier A, 1991, V20, P469, Res Policy Tsai WP, 1998, V41, P464, Acad Manage J	Intersection between economic geography and management/innovation	Predominantly economic geography-based: European Planning Studies, Entrepreneurship and Regional Development, Regional Studies	Krugman P, 1991, Geography Trade Powell WW, 1996, V41, P116, Admin Sci Quart Markusen A, 1996, V72, P293, Econ Geogr Almeida P, 1999, V45, P905, Manage Sci Lazerson M H, 1999, V8, P235, Ind Corp Change Pouder R, 1996, V21, P1192, Acad Manage Rev Porter ME, 1998, V76, P77, Harvard Bus Rev Storper M, 1995, V2, P191, European Urban Regio Gordon IR, 2000, V37, P513, Urban Stud Audretsch DB, 1996, V86, P630, Am Econ Rev Tallman S, 2004, V29, P258, Acad Manage Rev Martin R, 2006, V6, P395, J Econ Geogr Ahuja G, 2000, V45, P425, Admin Sci Quart Giuliani E, 2007, V7, P139, J Econ Geogr Lane PJ, 1998, V19, P461, Strategic Manage J Rowley T, 2000, V21, P369, Strategic Manage J Dyer JH, 1998, V23, P660, Acad Manage Rev Harrison B, 1992, V26, P469, Reg Stud Tsai WP, 1998, V41, P464, Acad Manage J Owen-Smith J, 2004, V15, P5, Organ Sci Breschi S, 2001, V10, P975, Ind Corp Change Keeble D, 1999, V33, P295, Reg Stud Piore Michael J, 1984, 2 Ind Divide Possibi Lundvall B A, 1992, Natl Systems Innovat
5	◆	Inter-firm networks, social capital and flows of knowledge E.g. Eisingerich et al., 2010 or Glückler 2007	Cohen WM, 1990, V35, P128, Admin Sci Quart Powell WW, 1996, V41, P116, Admin Sci Quart Mcevely B, 1999, V20, P1133, Strategic Manage J Dyer JH, 1998, V23, P660, Acad Manage Rev Ahuja G, 2000, V45, P425, Admin Sci Quart Bathelt H, 2004, V28, P31, Prog Hum Geog Gulati R, 2000, V21, P203, Strategic Manage J Burt R S, 1992, Structural Holes Soc Owen-Smith J, 2004, V15, P5, Organ Sci Gulati R, 1999, V20, P397, Strategic Manage J Zaheer A, 2005, V26, P809, Strategic Manage J Marshall A, 1920, Principles Ec Saxenian A, 1994, V128, Regional Advantage C Porter M, 1990, Competitive Advantag Lawson C, 1999, V33, P305, Reg Stud Tallman S, 2004, V29, P258, Acad Manage Rev	Predominantly management and Intersection between management/innovation and economic geography	Management (e.g. Organization Science, Academy of Management Review, Administrative Science Quarterly), innovation (Technovation, Research Policy) and economic geography/regional studies ones (e.g. Economic Geography, Journal of Economic Geography, Regional Studies, Entrepreneurship and Regional Development)	
6	□	Network-position analysis and technological gatekeepers E.g. Giuliani, 2013	Von Hippel E, 1987, V16, P291, Res Policy Cohen WM, 1990, V35, P128, Admin Sci Quart Nelson R R, 1982, Evolutionary Theory Giuliani E, 2005, V34, P47, Res Policy Wasserman S, 1994, Social Network Anal Carter AP, 1989, V18, P155, Res Policy Audretsch DB, 1996, V86, P630, Am Econ Rev Lazerson M H, 1999, V8, P235, Ind Corp Change Giuliani E, 2007, V7, P139, J Econ Geogr Lissoni F, 2001, V30, P1479, Res Policy Becattini G, 1990, P37, Ind Districts Interf Bathelt H, 2004, V28, P31, Prog Hum Geog Schrader S, 1991, V20, P153, Res Policy Dosi G, 1988, V26, P1120, J Econ Lit Capello R, 2005, V39, P75, Reg Stud Boschma RA, 2005, V39, P61, Reg Stud	Economic geography and innovation strand	Economic Geography, Journal of Economic Geography, Regional Studies, plus innovation ones (Industry and Innovation, Research Policy)	
Total						

Source: own, based on statistical cluster calculations over 3,955 documents in the first search; * for number of times cited, available upon request

Table 2. Articles (citing documents) in each subfield of research from first search (Figure 3)

Group 1. Evolutionary economic geography	Group 2. Global pipelines	Group 5. Inter-firm networks, social capital and flows of knowledge	Group 4. Innovation and firm analysis
Boschma et al., (2009) Boschma and Frenken, (2006) Boschma and Frenken, (2009) Boschma and Frenken, (2011) Cantner et al., (2010) Christiansen and Jakobsen, (2012) Coe, (2011) Elola et al., (2012) Eriksson and Lindgren, (2009) Eriksson et al., (2008) Eriksson, (2011) Essletzbichler and Rigby, (2007) Frenken and Boschma (2007) Hassink, (2010) Henning et al., (2013) Mackinnon et al., (2009) Martin and Sunley, (2006) Martin, (2010) Maskell and Malmberg, (2007) Menzel and Fornahl, (2010) Neffke et al., (2011) Potter and Watts, (2011) Ter Wal and Boschma, (2009) Ter Wal and Boschma, (2011) Valdaliso et al., (2011)	Bathelt et al., (2004) Bathelt and Glueckler, (2005) Bathelt and Boggs, (2003) Bathelt and Graef, (2008) Bathelt and Schuldt, (2008) Bathelt and Schuldt, (2010) Bathelt and Turi (2011) Bathelt, (2001) Bathelt, (2002) Bathelt, (2005) Bathelt, (2005) Britton, (2003) Britton, (2004) Depner and Bathelt, (2005) Lorenzen, (2007) Malmberg and Maskell, (2002) Malmberg et al., (2000) Maskell and Lorenzen, (2004) Maskell et al., (2006) Murphy, (2002) Murphy, (2006) Schuldt and Bathelt, (2009) Schuldt and Bathelt, (2011)	Arikan and Schilling, (2011) Arikan, (2009) Casanueva et al., (2013) Chiu and Lee, (2012) Eisingerich et al., (2010) Glueckler, (2007) Gnyawali and Srivastava, (2013) Gulati et al., (2012) Hsieh et al., (2012) Huggins and Johnston, (2010) Huggins and Johnston, (2012) Huggins et al., (2012) Huggins, (2008) Huggins, (2008) Huggins, (2011) Inkpen and Tsang, (2005) Kajikawa et al., (2010) Kajikawa et al., (2012) Malecki, (2012) Pitelis, (2012) Presutti et al., (2011) Presutti et al., (2013) Rosenkopf and Padula, (2008) Sammarra and Biggiro, (2008) Takeda et al., (2008) Whittington et al., (2009)	Belussi and Sedita, (2009) Belussi and Sedita, (2012) Belussi et al., (2008) Camison and Fores, (2011) Camison and Villar-Lopez, (2012) Camison, (2004) Camuffo and Grandinetti, (2009) D'Este et al., (2013) Exposito-Langa and Xavier Molina-Morales, (2010) Exposito-Langa et al., (2011) Hervas-Oliver and Albers-Garrigos, (2007) Hervas-Oliver and Albers-Garrigos, (2008) Hervas-Oliver and Albers-Garrigos, (2009) Hervas-Oliver et al., (2008) Hervas-Oliver et al., (2011) Hervas-Oliver et al., (2012) Li and Geng, (2012) Malecki, (2010a) Malecki, (2010b) Martinez-Fernandez et al., (2012) Molina-Morales and Exposito-Langa, (2012) Molina-Morales and Martinez-Fernandez, (2009) Molina-Morales and Martinez-Fernandez, (2003) Molina-Morales and Martinez-Fernandez, (2004a) Molina-Morales and Martinez-Fernandez, (2004b) Molina-Morales and Martinez-Fernandez, (2006) Molina-Morales and Martinez-Fernandez, (2008) Molina-Morales and Martinez-Fernandez, (2009) Molina-Morales and Martinez-Fernandez, (2010) Molina-Morales and Mas-Verdu, (2008) Molina-Morales et al., (2002) Molina-Morales et al., (2011) Molina-Morales et al., (2012) Molina-Morales, (2002) Moreno and Miguelez, (2012) van Hemert et al., (2013) Wu et al., (2010)
Group 3. Cluster taxonomies	Group 6. Network-position analysis and technological gatekeepers		
Cruz and Teixeira, (2010) Gordon and McCann, (2000) Gordon and McCann, (2005) Iammarino and McCann, (2006) McCann and Mudambi, (2005) McCann and Sheppard, (2003) Mccann, (2007)	Giuliani and Bell, (2005) Giuliani, (2005) Giuliani, (2011) Giuliani, (2013a) Giuliani, (2013b) Giuliani, (2007) Kesidou and Snijders, (2012) Morrison and Rabellotti, (2009) Morrison et al., (2013) Morrison, (2008) Petrou and Daskalopoulou, (2009)		

Source: own, based on the second search

Table 3. Articles of Figure 4, Figure 5

Figure 4. Agglomerations and Spinoffs	Figure 5. Agglomerations and firm performance	
Boschma and Weterings, (2005)	<i>A. sub-field of 27 articles</i>	<i>B. sub-field of 14 articles</i>
Boschma and Wenting, (2007)	Angel, (2002)	Baldwin et al., (2008)
Buenstorf and Fornahl, (2009)	Audia and Rider, (2010)	Beaudry and Schiffauerova, (2009)
Buenstorf and Klepper, (2010)	Buenstorf and Guenther, (2011)	Boschma and Weterings, (2005)
Camuffo and Grandinetti, (2011)	Canina et al., (2005)	Czarnitzki and Hottenrott, (2009)
De Figueiredo et al., (2013)	Coombs et al., (2009)	Engelstoft et at., (2006)
De Vaan et al., (2013)	De Vaan et al., (2013)	Eriksson and Lindgren, (2009)
Heebels and Boschma, (2011)	Delerue and Lejeune, (2012)	Eriksson et al., (2008)
Klepper, (2007)	Drucker and Feser, (2012)	Eriksson, (2011)
Klepper, (2009)	Drucker, (2011)	Fuellhart and Glasmeier, (2003)
Klepper, (2010)	Flyer and Shaver, (2003)	Fuellhart, (1999)
Klepper, (2011)	Folta et al., (2006)	Iammarion and McCann, (2006)
Kloosterman, (2008)	Gilbert et al, (2008)	Malmberg et al., (2000)
Mayer, (2013)	He and Wong, (2012)	Maskell and Malmberg, (1999)
	Jaffee, (2003)	Potter and Watts, (2011)
	Lee, (2009)	
	Liargovas and Daskalopoulou, (2011)	
	McCann and Folta, (2011)	
	McCann and Vroom, (2010)	
	Payne et al., (2009)	
	Pe'er and Keil, (2013)	
	Quintana-García and Benavides-Velasco, (2006)	
	Renski, (2011)	
	Shaver and Flyer, (2000)	
	Strotmann, (2007)	
	Stuart and Sorenson, (2003)	
	Wennberg and Lindqvist, (2010)	
	Whittington et al., (2009)	

Source: own; from the second search (1957-2013). More documents from the second search available upon

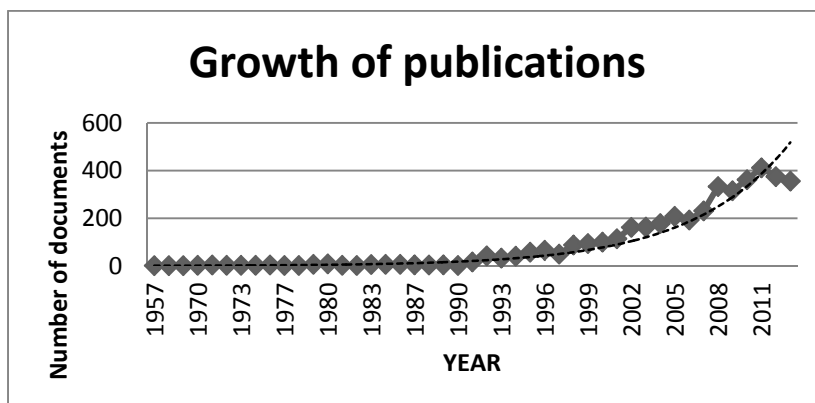
Appendix

Table A-1. First fifteen most cited papers (shared references) in the documents constitutive of the first search (industrial districts and clusters;1957-2013)

References	N times cited
Porter M, 1990, Competitive Advantag	489
Bathelt H, 2004, V28, P31, Prog Hum Geog	313
Krugman P, 1991, Geography Trade	279
Porter ME, 1998, V76, P77, Harvard Bus Rev	261
Cohen WM, 1990, V35, P128, Admin Sci Quart	255
Martin R, 2003, V3, P5, J Econ Geogr	247
Marshall A, 1920, Principles Ec	240
Saxenian A, 1994, Regional Advantage C	230
Markusen A, 1996, V72, P293, Econ Geogr	224
Nelson R R, 1982, Evolutionary Theory	220
Granovetter M, 1985, V91, P481, Am J Sociol	212
Storper M, 1997, Regional World Terri	208
Audretsch DB, 1996, V86, P630, Am Econ Rev	199
Lundvall B A, 1992, Natl Systems Innovat	197
Jaffe AB, 1993, V108, P577, Q J Econ	188

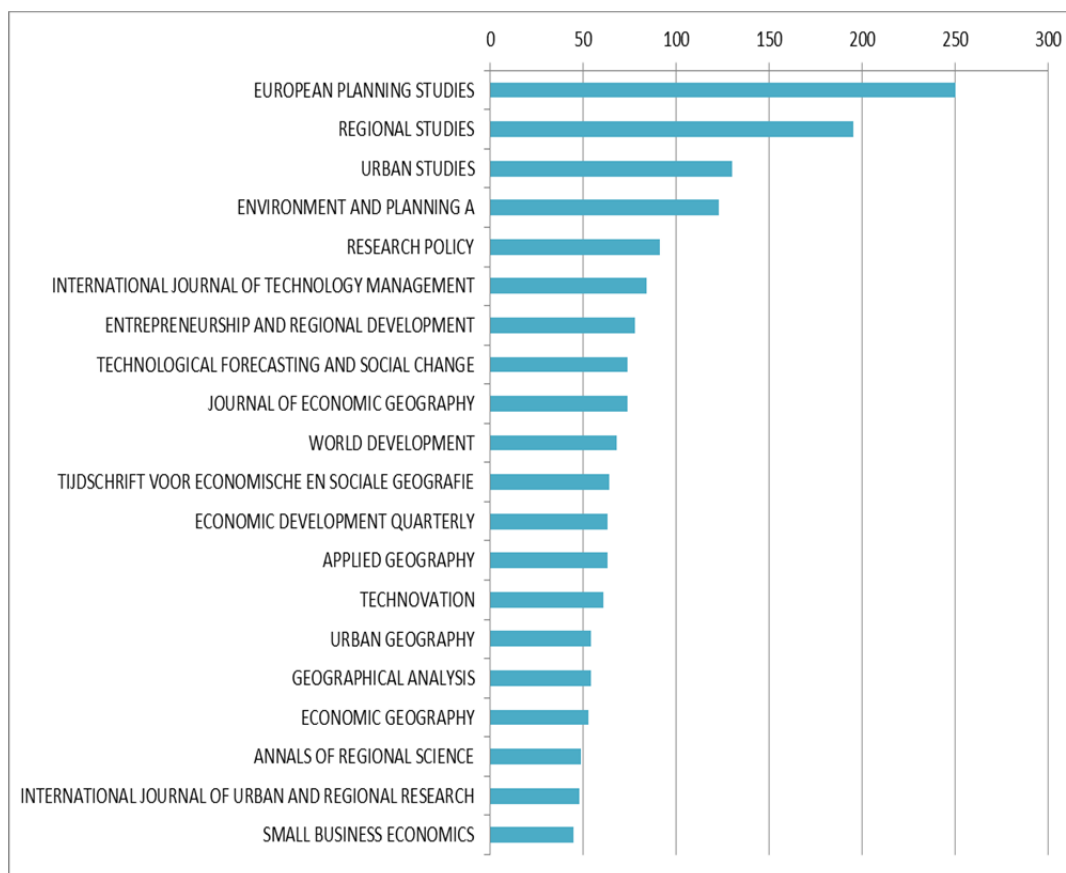
Source: own, from the first search and database (3,995); For the sake of brevity only 15 are showed. More results available upon request

Figure A-2. Growth of cluster/industrial district publications 1957-2013



Source: ours, from analysis of Web of Science

Figure A-3. The first twenty journals by number of articles listed in the first search (3,995 documents):



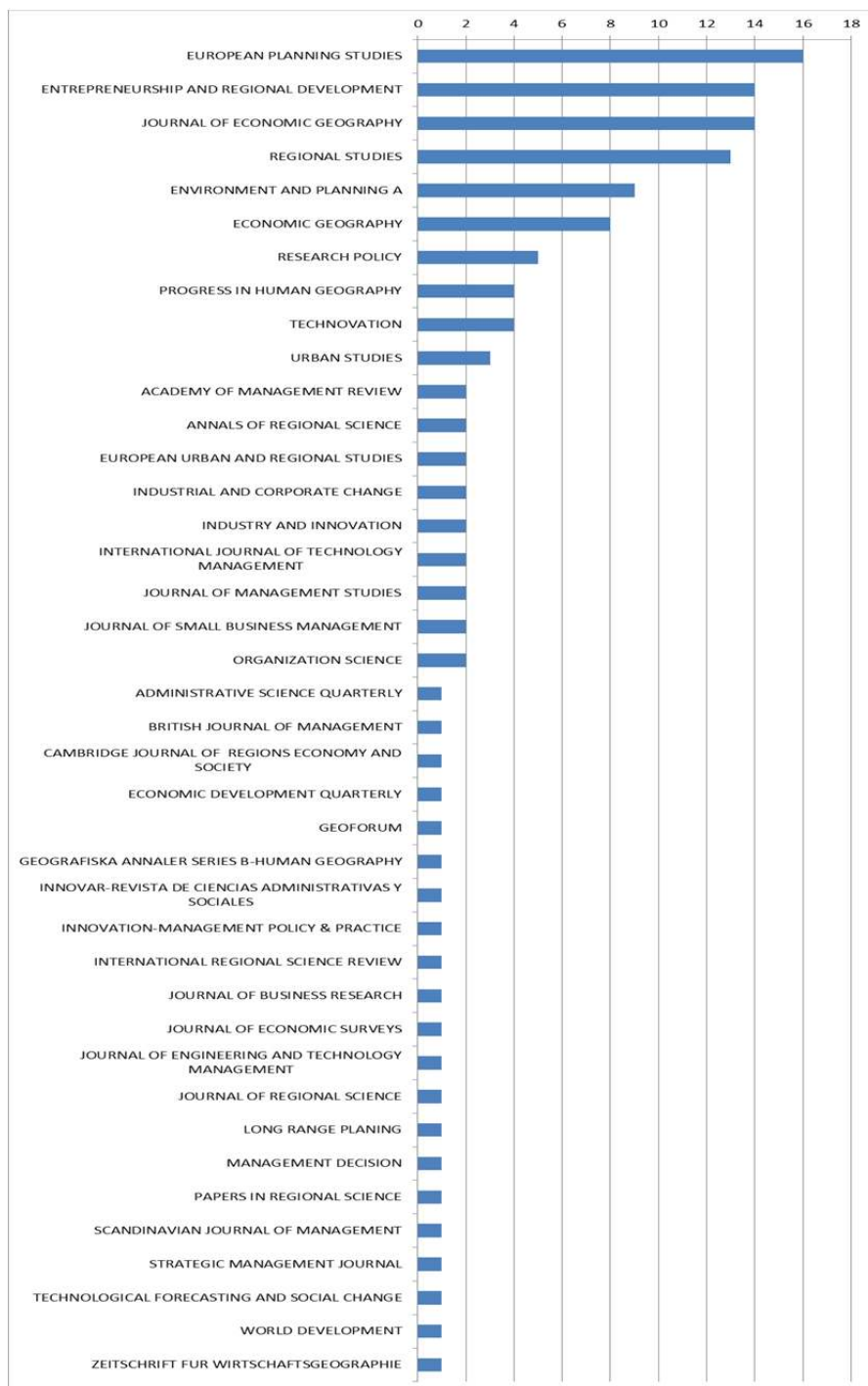
Source: own, from the first search

Table A-5. First fifteen most cited papers (shared references) in the documents constitutive of the second search (agglomerations;1957-2013)

References	N times cited
Krugman P, 1991, V99, P483, J Polit Econ	460
Krugman P., 1991, Geography Trade	349
Glaeser EL, 1992, V100, P1126, J Polit Econ	282
Venables, 1999, Spatial Ec Cities Re	274
Porter M. E., 1990, Competitive Advantag	273
Jaffe AB, 1993, V108, P577, Q J Econ	231
Jacobs J., 1969, Ec Cities	228
Marshall A, 1920, Principles Ec	217
Ciccone A, 1996, V86, P54, Am Econ Rev	200
Audretsch DB, 1996, V86, P630, Am Econ Rev	196
Ellison G, 1997, V105, P889, J Polit Econ	165
Dixit AK, 1977, V67, P297, Am Econ Rev	164
Marshall A., 1890, Principles Ec	162
Morgan K, 1997, V31, P491, Reg Stud	160
Lundvall Bengt-Ake, 1992, Natl Systems Innovat	159

Source: own, from the second search and database (2,419); not restricted to subsequent refinements (spinoffs or performance). For the sake of brevity only 15 are showed. More results available upon request

Figure A-4. Academic journals by number of articles in the final 129 citing documents (first search).



Source: own, from the first search