HEC MONTRÉAL

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Coworkers, Makers, and Fabbers
Global, Local and Internal Dynamics of Innovation
in Localized Communities in Barcelona

par

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Résumé

La capacité d'innovation des villes ne dépend pas exclusivement des processus d'innovation gérés par les organisations. Cette thèse vise à mettre l'accent sur le rôle que les acteurs extérieurs aux entreprises, en particulier les communautés, jouent dans les dynamiques des connaissances et de l'innovation, au niveau local comme au niveau global, contribuant ainsi à la capacité d'innovation et de créativité des villes. Cette recherche est basée sur l'étude de communautés d'innovation en milieu urbain comme celles qui émergent dans des espaces localisés d'innovation collaborative tels que les espaces de coworking, les espaces de makers / hackers, les Fab Labs, ou encore les Living Labs.

La thèse est composée par trois articles. Chaque article se centre sur un niveau d'analyse différent pour étudier les dynamiques des connaissances et d'innovation des communautés innovantes urbaines. Le premier article se centre sur les dynamiques des connaissances au niveau global. Le second article analyse les dynamiques d'innovation au niveau local, en considérant les interactions entre les communautés et d'autres acteurs locaux. Le troisième article se focalise sur les dynamiques internes au sein des communautés, en étudiant les pratiques collaboratives entre les membres. L'ensemble des trois articles offre une complète analyse des différentes échelles impliquées dans l'innovation.

Le premier article affirme que la proximité cognitive entre les membres des communautés similaires mais géographiquement éloignées contribue au transfert de connaissances (tacites). Ces «pipelines globaux» basés sur les communautés contribuent à nourrir le «buzz local» et dynamisent les processus locaux d'innovation.

Le second article reconnaît le rôle crucial que les communautés à l'extérieur des entreprises joue comme intermédiaires entre des individus créatifs et des organisations innovantes. À travers une étude qualitative des communautés émergentes dans des espaces de coworking à Barcelone, ma recherche montre comment les différentes dynamiques d'innovation impliquant des membres des communautés et des acteurs locaux (entreprises, citoyens et organismes gouvernementaux) sont reliées entre elles par l'articulation de lieux, d'espaces, de projets et d'événements.

Le troisième article examine, à la suite d'une démarche inductive et qualitative, les

pratiques de collaboration dans des espaces localisés de collaboration à travers une étude des espaces de coworking à Barcelone. Trois types d'approches de collaboration ont été identifiées: 1) la collaboration en fonction du coût, où les agents sont motivés à réduire leurs coûts d'exploitation et les coûts de transaction liés à la collaboration; 2) la collaboration basée sur les ressources, où les agents collaborent pour apprendre ou pour complémenter leurs ressources par l'intégration de ressources et connaissances externes; et 3) la collaboration relationnelle, où les acteurs se livrent à des pratiques de collaboration synergique intenses. Les résultats contribuent à la littérature sur la collaboration inter-organisationnelle, et sur la dynamique de l'innovation dans les villes.

Mots-clés:

dynamiques d'innovation; collaboration inter-organisationnelle; innovation dans les villes; communautés d'innovation; espaces de cotravail; étude de cas; recherche qualitative

Abstract

The innovative capacity of cities does not exclusively depend on the innovation processes managed by local organizations. This thesis aims to emphasize the role that actors outside firms, especially communities, play in facilitating knowledge and innovation dynamics at both the local and global levels, thus contributing to the innovative and creative capacity of cities. The research is based on the study of urban innovation communities like the ones that emerge in localized spaces of collaborative innovation such as coworking spaces, maker / hacker spaces, Fab Labs, or Living Labs.

The thesis is composed of three articles. Each article focuses on a different level of analysis of the knowledge and innovation dynamics of urban innovative communities. The first article is centered on the knowledge dynamics at the global level. The second article analyzes the dynamics of innovation at the local level, considering the interactions between the communities and other local actors. The third article takes a closer look on the internal dynamics within communities, by studying the collaborative practices among community insiders. The three articles taken together offer a comprehensive analysis of the different scales of innovation.

The first article argues that the cognitive proximity between members of similar but geographically distant communities, contributes to the transfer of (tacit) knowledge. These community-based "global pipelines" contribute to nurture the "local buzz" and dynamize the local processes of innovation.

The second article acknowledges the crucial role of communities outside firms as intermediaries between creative individuals and innovative formal organizations. Through a qualitative study of the communities emerging in coworking spaces in Barcelona, my research shows how the different dynamics of innovation involving community insiders and local actors (firms, citizens and governmental bodies) are interrelated through the articulation of places, spaces, projects and events.

The third article discusses the collaboration practices in localized spaces of collaboration through a study of coworking spaces in Barcelona, following an inductive and qualitative approach. Three types of collaboration approaches are identified: 1) cost-related

collaboration, where agents are motivated in reducing their operational costs and the transaction costs related to collaboration; 2) resource-based collaboration, where agents collaborate to learn or complement their resources by integrating external resources and knowledge; and 3) relational collaboration, where actors engage in intense synergistic collaborative practices. The findings contribute to the literature on inter-organizational collaboration, and on dynamics of innovation in cities.

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List of acronyms

CWS   coworking space

TCE   transaction cost economics

RBV   resource-based view

This thesis is dedicated to Emma, Olivia and Leonard.
For your love, support and patience.

Acknowledgements

Four years ago, I started my PhD thesis without really knowing what exactly a thesis was about. I had spent the previous fifteen years of my professional life working first as an engineer, then as a manager and finally as an entrepreneur. I decided to enroll in a PhD program far from my hometown in part to challenge myself, and in part to seek for new horizons in my career. Now I am extremely happy seeing that I have been able to attain my goals. It has been an amazing trip that has not only helped me to start a new exciting professional life but more importantly, has deeply changed me at a personal level.

Hereby, I want to acknowledge and thank all the people that have helped me to achieve this thesis, giving me support, guidance, mentorship, opportunities, friendship and love.

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Last, but not least, I want to express my gratitude and love to my friends and family, specially to my parents, my brother and my sisters. To Emma and our most precious treasures, Olivia and Leonard.

Chapter 1: Introduction

Major trends in the literature on innovation, like user-driven innovation or open innovation, have acknowledged the crucial role that actors outside the boundaries of the firm play in the innovative processes. Firms tap on the creative and innovative capacity of external sources like individuals, communities or formal organizations. Nevertheless, the literature on innovation in organizations has ignored the localized character of the dynamics of innovation between the different actors.

In another field of research, economic geography scholars have extensively studied the knowledge and innovation dynamics within industrial agglomerations but their studies have mainly exclusively focused on the localized processes taking place among formal organizations.

The aim of this thesis is to contribute to both bodies of literature, innovation in organizations and innovation in territories, to fill these gaps. From one side, my research project focuses on the innovation communities outside firms that emerge in an urban environment and that are deeply embedded in the territory. On the other side, the findings show the important role that these communities play in the localized innovation processes both at the local and at the global level.

Dynamics of innovation evolve through intertwined processes at several scales (Bunnell and Coe 2001). The sources of innovation are diverse, and consequently, to understand their dynamics, the study has to take into account different levels of analysis: individuals, communities and firms. Furthermore, localized communities engage in innovation processes at different levels of geographic proximity. Firstly, interaction and collaboration among community members lead to the development of innovations at the internal level of the community. Secondly, interaction between the community insiders and outsiders that are localized in the geographic proximity, influence the innovation dynamics at the local level of the district or the city. Thirdly, beyond the participation in innovation processes at a local scale, facilitated by geographic proximity, communities engage in dynamics of knowledge sharing and innovation with distant actors. In this case, the cognitive proximity

with other similar distant communities foster the transfer of (tacit) knowledge and contribute to the creation of the so-called "global pipelines" (Bathelt, Malmberg, and Maskell 2004).

The thesis aims to contribute to the current literature by tackling the following general research question:

> *How localized knowing communities contribute to the local and global knowledge dynamics?*

In order to answer to his question, the research is structured in three sub-questions, each of them being developed in a separate article. The research sub-questions are:

- How the local and global knowledge dynamics of localized knowing communities outside firms contribute to the innovation capacity of territories?
- How localized knowing communities, like the ones emerging on coworking spaces, participate in the knowledge dynamics of their local environment?
- How do the knowledge dynamics in coworking spaces affect inter-organizational collaborations?

The goal of these three research questions and corresponding articles is to contribute to the study of knowledge dynamics in communities in their local and global contexts from different perspectives. Figure 1 schematically represents these different angles of the analysis. Article 1 takes a macro perspective to study the knowledge dynamics between communities and other external actors at the local and global level. Article 2 reduces the scope of the analysis, to focus on the local dynamics within a city. Contrarily to the two other articles, article 3 takes a closer look into the internal knowledge dynamics of a community by studying the knowledge dynamics involved in inter-organizational collaborations in coworking spaces.
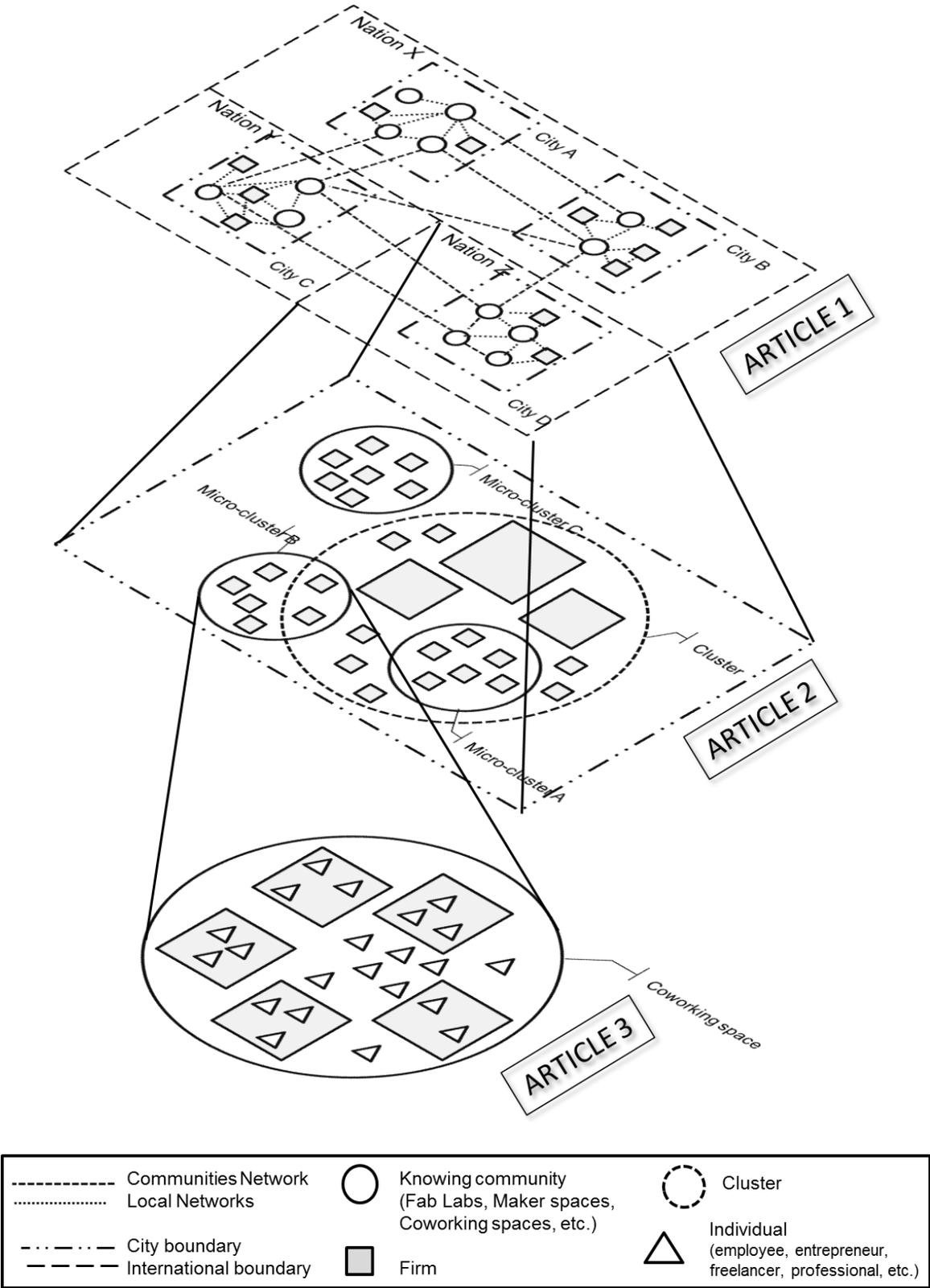
Figure 1. A schematic representation of the research project

The aim of the **first article** is to emphasize the role that communities outside play in the knowledge dynamics both at the local and at the global level. The article proposes a community-based model that complements the buzz-and-pipeline model (Bathelt et al. 2004; Maskell, Bathelt, and Malmberg 2006) that claims that clusters of economic activity need both a rich "local buzz" and the creation of "global pipelines" with external actors to increase their innovative capacity. Specifically, the article studies three types of communities in the city of Barcelona: a community of fabbers, a community of makers and a community of coworkers. The members of these local communities also belong to a wider community related to global movements: the Fab Lab movement, the maker movement and the coworking movement. These emergent communities usually develop in urban environments and actively participate in the development and dynamization of the innovative and creative capacity of cities. The communities are deeply embedded in their local environment, engaging in the local knowledge and innovation processes and participating in the "local buzz". In parallel, these communities reinforce the local ecosystem of innovation by creating "global pipelines" with similar external communities that are related to the same global movement. Knowledge transfer between distant similar communities is facilitated by the cognitive proximity that bonds members of knowing communities and that appears more determinant than geographic proximity.

The **second article** deepens in the understanding of the role that creative individuals and communities outside firms play in the development of the innovative capacity of cities The study takes a multi-level perspective building on the concept of the intermediary actors of the "middleground" (Cohendet, Grandadam, and Simon 2010) to explain how coworking spaces serve as platforms for interaction, knowledge sharing and collaboration between creative individuals of the "underground" and formal innovative firms belonging to the "upperground". The article shows through an empirical study of innovative communities of coworking spaces in Barcelona how places, spaces, projects and events (Grandadam, Cohendet, and Simon 2012) serve as the building blocks at the base of the dynamics of innovation of the "middleground". The findings suggest how policy makers can facilitate

the local innovation of cities by nurturing such structures and by tapping on the collective and distributed creativity of cities.

The **third article** takes a closer look on the innovation processes within communities outside firms in urban environments by studying the dynamics within the members of coworking spaces. The results derived from our empirical study of the inter-organizational collaboration in different coworking space in Barcelona show three types of collaborative approaches that characterize three corresponding types of coworking spaces. A first type of coworking space focuses on cost-related collaboration. In these spaces, members are motivated in reducing their operational costs and the transaction costs related to collaboration. A second type of spaces is characterized by a resource-based collaboration, where agents collaborate to learn or complement their resources by integrating external resources and sources of knowledge. A third type of spaces is centered on relational collaboration, where actors engage in intense synergistic collaborative practices. Our findings show that the three types of collaboration are interrelated and might represent incremental stages in collaborative practices, being the relational collaboration the approach that produces the most dynamic innovative environment. The research also underlines the critical role that managers of the coworking spaces play by guiding and supporting the collaborative and innovative processes. The article contributes to the research on inter-organizational collaboration by explaining how the physical environment and the action of facilitators can foster the implementation of different collaborative practices among colocated economic agents.

The next sections of this introductory chapter present the literature review, the conceptual framework and the methodology common to the three articles that compose this thesis in order to clarify the complementarity and relationship between them.

The scope and focus of the three articles are summarized in Table 3.

	Article 1	**Article 2**	**Article 3**
Article Title	Knowing communities and the innovative capacity of cities	Coworking spaces and the localized dynamics of innovation. The case of Barcelona.	Different inter-organizational collaboration approaches in coworking spaces in Barcelona
Article research question	How the local and global knowledge dynamics of localized knowing communities outside firms contribute to the innovation capacity of territories?	How localized knowing communities, like the ones emerging on coworking spaces, participate in the knowledge dynamics of their local environment?	How do the knowledge dynamics in coworking spaces affect inter-organizational collaborations?
Field	Economic Geography	Economic Geography	Management
Sub-field	Urban Studies; Knowledge, Innovation and Geography	Knowledge management, Innovation and Geography	Knowledge management; Innovation; Inter-organizational collaboration
Theorical framework	Clusters; Buzz-and-pipeline model; Knowing communities	Clusters; Knowing communities	RBV, Knowledge-based theory of the firm
Article type	Conceptual (model) with empirical illustration	Empirical	Empirical
Research Methodology	Multiple-case study	Multiple-case study	Multiple-case study
Studied cases	1 Fab Lab, 1 Maker space, 1 Coworking space	21 Coworking spaces	21 Coworking spaces
Main data sources	Semi-structured interviews, observations, documents	Semi-structured interviews, observations, documents	Semi-structured interviews, observations, documents
Theoretical conversations	The geography of knowing communities	The geography of knowing communities	Inter-organizational collaboration

Table 3: Summary of the articles

1.1. Literature review

In this section, the main research fields that the thesis deals with are reviewed. The rationale in this literature review has been to relate in a coherent form different research topics that have been studied in different disciplines (like knowledge creation dynamics or communities that have been studied in management as well as in economic geography) in order to frame theoretically the thesis. Some bodies of literature that are specifically related to a specific article have not been included here and have been discussed in the corresponding article, as it is the case for the literature review on inter-organizational collaboration in management.

The literature review has been broadly divided into three streams. The first part deals with the literature on tacit knowledge and the importance of its context dependence. This part mainly reviews the concept of tacit knowledge in the literature on economic geography. It also serves as the base of the second part of the literature review that deals more specifically about the dynamics of the knowledge creation in clusters. The third part deals with the literature on knowing communities. This literature that was initially developed by researchers in social sciences had a high impact on the literature on management that mainly built on the concept on communities of practice. Later on, the literature on economic geography acknowledged the importance of communities in the tacit knowledge creation and transfer dynamics.

1.1.1. Tacit knowledge and its context dependence

1.1.1.1. Tacit knowledge: a brief introduction

In the research on management, innovation and organizational learning, the distinction between tacit and codified knowledge has been accorded great importance, mainly since the theory of the knowledge-creating company by Nonaka and Takeuchi (1995). The relevance of tacit knowledge had been already underlined on the creation of organizational routines following the evolutionary perspective on the technological change developed by Nelson

and Winter (1982). These authors helped to widely spread the concept and to revive the works of Michael Polanyi (1966). Tacit knowledge is currently acknowledged as being crucial for the understanding of the knowledge economy and learning dynamics within organizations. The concept has also been referred as a central component on the geography of innovation and the persistent phenomenon of industrial clustering despite the increasing development of communication technologies.

The phrase "we can know more than we can tell" (Polanyi 1966) expresses the main distinction between tacit and codified (or explicit) knowledge. The reasons behind why can't we express all that we know lies on two aspects. The first limit is consciousness or awareness. Even the most skilled artisan or athlete is not fully conscious of all his movements as skills depend on "the observance of a set of rules which are not known as such to the person following them" (Polanyi 1962:49). Thus, to transmit his expertise results difficult, despite his best efforts. The second limit is related to the difficulties in communicating and expressing knowledge, even if the individual has reached full awareness of his knowledge. Spoken or written words as vehicles of communication, cannot express the richness of thoughts, ideas and knowledge. In some cases, even pictures, animations or multimedia cannot serve as communication all the knowledge aimed to be transmitted.

The difficulty on codifying tacit knowledge leads to the idea that it can only be acquired through experience. Howells and Roberts (2000:53) defines tacit knowledge as "know-how that is acquired via the informal take-up of learned behaviors and procedures". The idea of "learning by doing" (Arrow 1962) is behind the creation and transmission of tacit knowledge and according to Maskell and Malmberg (1999a:172) "tacit knowledge can only be produced in practice".

Despite that knowledge is an intrinsically individual characteristic; the intertwined processes of knowledge creation and transmission have a social component. It is generally accepted that tacit knowledge can only be shared if individuals share a common social

frame composed of shared values, language and culture. I shall return to this point when tackling the concept of optimal cognitive distance and related concepts of absorptive capacity.

Contrary to some misinterpretations of the concepts of tacit and explicit knowledge expressed by Michael Polanyi, both kinds of knowledge are not separated from one another or represent antagonistic concepts. Tacit knowledge represents a complement to explicit knowledge and vice versa. Tacit knowledge contributes to the acquisition and transfer of explicit knowledge through the sharing of tacit common rules, routines and conventions (Hodgson 1988; Howells 2012; Lundvall and Johnson 1994).

1.1.1.2.   *Tacit knowledge and the geography of innovation*

Due to its dependence and stickiness to the geographic and social context, the important role of tacit knowledge has also been underlined in the literature on economic geography (Gertler 2003; Howells 2002; Lawson and Lorenz 1999; Maskell and Malmberg 1999a; Morgan 2004). The general assumption is that by its difficulty of being codified and its dependence on context-specificity, tacit knowledge is more difficult to transfer through distance. It is by constant, direct and face-to-face interaction between actors that tacit knowledge can be shared, interpreted and used. Thus, in situations where intensive tacit knowledge transfer takes place, economic actors will tend to locate in geographical proximity. According to this view, codified knowledge, contrary to tacit knowledge, can be acquired relatively intact at a distance by the effect of its "ubiquitification" (Maskell and Malmberg 1999b) and consequently, actors could avoid geographical proximity. However, the concept of "tacit=local" and "codified=global" has been challenged from different perspectives.

Firstly, the apparent dichotomy and differentiation between these two kinds of knowledge has been questioned as ''each form of knowledge can often be used as an aid in acquiring the other'' (Cook & Brown 1999, p.385). The interdependency of tacit and codified knowledge was also underlined by Nonaka and Takeuchi (1995) in their model of

knowledge creation in organizations.

Secondly, different industries use different knowledge bases, some needing a higher degree of tacitness than others but nevertheless, this does not seem to be related to the degree of geographic concentration. There is no evidence that industries based on a more codified knowledge (i.e. analytical knowledge) show a lower geographical concentration that industries based on more tacit types of knowledge (i.e. symbolic knowledge). For instance, as Asheim and Gertler (2006) remarked, biotechnology despite using extensively analytical knowledge is developed in a small number of highly clustered centers around the world, contributing to the idea that codified knowledge is also highly "sticky" circulating in a large degree there where it has been produced.

Thirdly, tacit knowledge can also be transmitted through distance by the temporary relocation of individuals. For instance, by participating to trade fairs, congresses, conferences and other events (Bathelt and Schuldt 2010; Schuldt and Bathelt 2011), actors can transfer their locally-acquired tacit knowledge to other actors externally located. At the same time, they can absorb external knowledge by participating to these "temporary clusters" (Bathelt and Schuldt 2008; Maskell, Bathelt, and Malmberg 2004; Maskell et al. 2006) that they later will feed into the common knowledge pool of their local environment. In this way, tacit knowledge circulates through long distances by "global pipelines" and contributes to enrich the "local buzz" (Bathelt et al. 2004). The next section is dedicated to the discussion of the knowledge dynamics in clusters and the buzz-and-pipeline model (Bathelt et al. 2004; Maskell et al. 2006).

1.1.2. Clusters and the dynamics of knowledge creation

In this part of the literature review, the concept of cluster is presented and linked to the research on the knowledge creation and transfer dynamics that take place in them. Finally, I review the research that has introduced in the economic geography literature concepts initially used in the literature in management (like absorptive capacity or capabilities).

1.1.2.1. *Clusters*

The concept of cluster as a local industrial agglomeration and specialization is not new (Marshall 1890, 1919) but has gained a renewed interest not only for economic geographers, but also policy makers since Porter's works (Porter 1990, 2000). Even if the concept of cluster has been used with different connotations (Martin and Sunley 2003), clusters can be broadly defined as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also co-operate" (Porter, 1998, p.197).

Clusters have been conceptualized around the interconnection of major firms and institutions, linked by complementarities and commonalities. These bonds have a horizontal and a vertical dimension. The horizontal dimension consists of firms producing similar services and competing with each other. Competition among clustered firms forces innovation and product differentiation (Maskell 2001; Porter 1990, 1998). The vertical dimension is based on the complementarities of the co-located forms of the cluster, thus creating networks of suppliers and customers. Both dimensions, horizontal and vertical, are intimately related and reciprocally nourish themselves stimulating the growth of the cluster as Marshall already observed (Marshall 1919).

Clusters have been conceptualized as agglomerations of separate economic entities that even if they are in some sense related, they are not joined together by any common ownership or management (Maskell and Lorenzen 2004). Most of the links between firms involve social relationships and the building of networks that are beneficial for the insiders. Nevertheless, inter-firm networks represent different configurations than clusters. Each configuration is adapted to different market conditions and characteristics. Inter-firm networks are mainly based on strong ties, based on trust among the members, fruit of a high-cost investment. The entry barriers for newcomers are consequently high. Networks are mainly found in markets with a low or modest uncertainty and high stability (Maskell

and Lorenzen 2004). In contrast, in industries with a high uncertainty or ambiguity, clusters rather than networks appear as a more convenient market organization. Clusters are arrangements based on weak ties, and are consequently more flexible because insiders have lower costs to construct links with other members. Instead of building dyadic bonds of trusts, clusters shareholders relationships are based on social trust and reputation (Maskell and Lorenzen 2004).

1.1.2.2.   *The buzz-and-pipelines model*

Cluster configurations are characterized by the local circulation of information and knowledge that are shared by all the co-located actors and that has been referred as buzz (Storper and Venables 2004), local broadcasting (Owen-Smith and Powell 2004) or noise (Grabher 2002a). Local buzz (Storper and Venables 2004) refers to "the information and communication ecology created by face-to-face contacts, co-presence and co-location of people and firms within the same industry and place or region" (Bathelt et al. 2004). Co-located actors profit of the shared informations, gossips and knowledge even without getting actively involved in the ongoing conversations, just by "being there" (Gertler 1995). Economic agents within a cluster profit from externalities at low cost, thus reducing the cost of information seeking and knowledge transfer. This is why, in an economic environment of uncertainty, firms opt by integrating a cluster rather than creating inter-firm networks. Networks construction involves sunk costs by building strong ties with other firms that might become obsolete in an ever-changing environment. A cluster configuration, based on weak ties (Granovetter 1973) result in a more agile configuration: it can adapt to changes either in ambiguous situations or in markets that require a constant adaptation or customization of products and services to different customers and market circumstances, as it is the case in the knowledge intensive industries. As the construction of ties has a lower cost than in a network, firms can create ties with a higher number of firms. Collaborations to innovate also allow redistributing the risk related to market uncertainty. Co-location also facilitates the circulation of best-practices, thus increasing the internal competition of the members of the cluster and at the same time increasing the overall competitiveness of the

cluster.

Clusters' insiders are exposed to a large and diverse knowledge pool. Although each organization masters specific and limited capabilities, they can benefit of other members' capabilities by collaborating. In this way, clusters facilitate the integration of diversity and the combination of complementarities contributing to the cross-pollination of different bodies of knowledge and expertise that benefit a cluster's capacity of innovation and its differentiation through the creation of "localized capabilities" (Maskell and Malmberg 1999a, 1999b).

Collaborations among organizations are often coordinated in the form of projects that facilitate goal-focus temporary relationships where complementary bodies of knowledge are combined to reach an innovative endeavor. Project-based interactions also allow to change partners with agility and to adapt to constantly changing markets. Ad hoc collaborations allow the integration of different firms' capabilities and specialties ensuring the competitiveness of the involved firms and consequently their survival.

The collaboration between members with different knowledge bases and cognitive frames of reference is promoted by a common institutional frame that reduces the cognitive distance and facilitates communication flows. However, the frequent interaction and interdependence between insiders can also derive in the long-term into the creation rigid structures of relationships leading the cluster to a lock-in effect (Maskell and Malmberg 2007; Visser and Boschma 2004). The creation of "global pipelines" (Bathelt et al. 2004) (that is the knowledge interchange with distant actors) can counterbalance this effect, by providing the cluster with new knowledge from external sources. External knowledge, brought by boundary spanners into the cluster, is integrated into the local buzz, enriching the cluster's shared knowledge pool and increasing its competitiveness. In a similar way, global pipelines also serve as vehicles for local-generated knowledge to reach distant clusters, contributing to the visibility of the cluster at a global level.

The buzz-and-pipelines model (Bathelt et al. 2004; Maskell et al. 2006) argues that a

combination of a rich "local buzz" together with the creation and nurturing of "global pipelines" will ensure the innovation capacity of a territory. The knowledge dynamics in the local buzz and in the global pipelines is radically different. In the local buzz, the knowledge transfer is "largely 'automatic'" (Bathelt et al. 2004) and all collocated actors benefit from this shared knowledge and information. They do not have to do a voluntary and intentional effort to profit from the buzz. In opposition, the creation of "global pipelines" (the extra-local linkages between two distant actors) implies a cost of creating and maintaining such networks. These "pipelines" have been acknowledged as being crucial to transfer external knowledge, in particular tacit, to the local environment thus producing local growth (Grabher 2002b; Owen-Smith and Powell 2004; Scott 2002).

However, what remains unexplained in the buzz-and-pipelines model is why actors can take a passive role and still be able to profit from the knowledge embedded in the "local buzz" but have to take an active role to profit from the knowledge in the "global pipelines". In other words, why the costs related to the access and identification of new useful knowledge is higher in the case of global pipelines than in the case of the "local buzz".

1.1.2.3. Cognitive distance, absorptive capacity, and localized capabilities

To be exposed to new knowledge is not a sufficient condition to take advantage from it. Absorptive capacity (Cohen and Levinthal 1990) is required for detecting, understanding and integrating the new knowledge that can potentially be acquired both locally or globally through the action of the buzz or pipelines. The efficiency of the knowledge transfer, especially in the case of tacit knowledge, depends not only on the availability of such knowledge but also on the cognitive distance (Nooteboom 2000) between interacting individuals. Research on learning dynamics has shown that the best conditions for learning are when (a) the knowledge bases of the two actors are different enough in order that they both gain new knowledge in their interaction, and (b) their cognitive structures are not too different in order to find a common ground on which communication is fruitful. A balance has to be reached to attain an optimal cognitive distance (Nooteboom et al. 2007).

In the case of the "local buzz", the cognitive, institutional and geographic proximity will

ensure that the actors can take advantage of the knowledge embedded in their local context. In the case of the "global pipelines", the conditions are quite different: the reduced geographical proximity and other types of proximity, like institutional and organizational, might difficult the communication between actors. However, cognitive proximity can take a major role and substitute the absence of geographical proximity to allow communication and understanding between two actors (Boschma 2005).

From an organizational point of view, the cognitive distance between the members of different organizations will lead to different absorptive capacities (Cohen and Levinthal 1990). Depending on the absorptive capacity developed over time, firms have the ability to recognize, absorb and use successfully external knowledge. In other words, the capacity of a firm to develop and commercialize new products and services will depend on the past developments and their own investments in knowledge creation. Firms' capabilities are developed over time and embedded in the organization in the form of routines and knowledge. Organizations have specific capabilities that are the base to their competitiveness and represent their resources to be differentiated from their competition.

In a similar way, the literature on evolutionary economic geography has underlined the path-dependency of the innovation in regions, based on their localized capabilities (Maskell and Malmberg 1999a, 1999b) derived from the combination and recombination of new knowledge that they have acquired considering the absorptive capacity of local firms. The detection, understanding, acquisition, and exploitation of new knowledge, especially tacit knowledge, can only be accomplished if there is a cognitive proximity with the knowledge creator that allows the disembedding of the original knowledge context.

Being the localized capabilities of a territory dependent on the absorptive capacities of the firms and organizations that configure the local environment, it is a key element to consider how the external knowledge is absorbed and recombined with the existing knowledge embedded in local firms to understand the innovation capacity of territories.

Considering a social-based construction of knowledge that is developed in the everyday practice and interaction of individuals, the concept of knowing communities gain a special interest in order to understand the abilities of territories to develop their innovation capability.

1 5

1.1.3. The geography of knowing communities

As it has been exposed so far, knowledge is dependent on the context. Its meaning and interpretation might change depending on the context knowledge is created and shared. Joining the activity-theory perspective of knowledge creation through practice, the point of view of Brown and Duguid (2000; 2001) is that knowledge is developed on the praxis of everyday work, with the influence of improvisation and experimentation. In this perspective, knowledge, beyond being an individual's property, is considered a social construction. It is by interaction that individuals collectively create and transfer knowledge. Research on communities of practice (Brown and Duguid 2000b; Wenger 1998) has experienced an explosion since the publication of Wenger's seminal book (Wenger 1998). The extended use of the term community of practice has been applied to multiple groups, contributing to the vagueness of the meaning (Amin and Roberts 2008). Beyond this concept, a multiplicity of terms have been used in the literature to refer to communities of shared practice and their knowledge outcomes like collectivities of practice (Lindkvist 2005), epistemic communities (Cowan, David, and Foray 2000; Knorr-cetina 2009; Steinmueller 2000), professional communities (Amin and Roberts 2008), knowledge-intensive communities (Cohendet, Creplet, and Diani 2004), knowledge communities (Henry and Pinch 2000) or transnational communities (Coe and Bunnell 2003; Morgan 2001; Saxenian 2006).

The literature on such communities has opened a new research perspective on the processes of knowledge creation and innovation in economic geography (Amin and Cohendet 2004; Coe and Bunnell 2003; Gertler 2003; Henry and Pinch 2000; Howells 2002; Malmberg and Maskell 2006; Morgan 2001) by underlining the social aspect of knowledge creation and diffusion and the contextual and localized character of the (tacit) knowledge dynamics (Lave and Wenger 1991; Wenger 1998).

In this thesis, the use of the term knowing communities (Amin and Roberts 2008; Boland and Tenkasi 1995) has been chosen to consider a broad concept that can include terms that refer to localized communities as well as communities composed of distant members. I use

the term knowing community referring to a relatively stable group of "members working in close proximity to one another, in which identity formation through participation and the negotiation of meaning are central to learning and knowledge generation" (Amin & Roberts 2008, p.355). This broad definition does not necessarily imply face-to-face interaction. The term proximity refers not only to geographical proximity but to other types of proximity (Boschma 2005; Bouba-Olga and Grossetti 2008), so the definition also includes concepts like networks of practice or virtual communities.

Beyond situated practices and local knowledge transfer, knowing communities have the ability of transferring knowledge externally through their cognitive proximity to members of distant but similar communities, like has reflected the literature on non-localized communities, referred to as constellations of practice (Faulconbridge 2010; Wenger 1998), networks of practice (Agterberg et al. 2010; Brown and Duguid 2001; Tagliaventi and Mattarelli 2006; Teigland 2003; Wenger, MacDermott, and Snyder 2002) or virtual communities (Amin and Roberts 2008; Huysman and Wulf 2005; Kavanaugh et al. 2005). Knowing communities present two different and apparently contrary characteristics: on one side, they are deeply embedded in their local context and, on the other side, they can re-contextualize their knowledge in a geographically distant but similar cognitive context in what Coe and Bunnell (2001) call the "de-territorialisation of closeness".

Geographical proximity is neither a sufficient nor a necessary condition for optimal communication (Boschma 2005). In communities, cognitive proximity might complement or even replace geographical proximity (Amin and Cohendet 1999, 2000). Individuals that are not co-located but have cognitive proximity might have a more productive dialogue than other actors in geographical proximity. Therefore, inter-regional and international social networks of peers might generate a more significant knowledge creation and transfer than localized interactions (Amin and Cohendet 2000; Gertler 2003). As Gertler affirms: "communities of practice are seen as the principal mechanism through which tacit knowledge relating to new practices is produced and spread" (Gertler 2001). In this way, knowing communities are also vehicles through which "best practices" may be spread

throughout large (including multilocational) organizations (Gertler 2001). Following this perspective, communities contribute to the inter-regional transfer of tacit knowledge differing from the learning region approach (Asheim 1996; Cooke and Morgan 1998) that underlines the intimate relation between for tacit knowledge and co-location. Similar arguments have been put forward to explain that concepts like communities of practice initially developed to explain localized environment of situated learning (Lave and Wenger 1991) have been extended to concepts like networks of practice. These delocalized communities show similar knowledge dynamics to the ones observed in localized communities as in both cases, the members share a set of values, practices and feelings of identity and belonging (Wenger 1998).

1.2. Epistemic and organizational aspects

Taken as a whole, the research project considers different types of knowledge dynamics and organizational forms. Before describing the conceptual framework, this section introduces the epistemic and organizational aspects that are used in the theoretical models.

1.2.1. Epistemic dimension

The research focuses on the dynamics of tacit knowledge even though the concepts of tacit and explicit knowledge are intimately intertwined. The study of tacit knowledge has to consider inevitably codified forms of knowledge.

The term knowledge dynamics can be considered to be broad and can include different aspects related with knowledge as its creation, transfer, assimilation, coordination, integration, or eventually forgetting. Even though, I use the term "dynamics" in the frame of the thesis and on the description of the drafts of the three articles, the research focuses mainly on the knowledge transfer and integration. The distinction between transferring and integrating are radically different, as Grant (1996) clearly expresses:

> *"(...) transferring knowledge is not an efficient approach to integrating knowledge. If production requires the integration of many people's specialist knowledge, the key to efficiency is to achieve effective integration while minimizing knowledge transfer through cross-learning by organizational members. If Grant and Spender wish to write a joint paper together, efficiency is maximized not by Grant learning everything that Spender knows (and vice versa), but by establishing a mode of interaction such that Grant's knowledge of economics is integrated with Spender's knowledge of philosophy, psychology and technology, while minimizing the time spent transferring knowledge between them."*

The concept of transferring knowledge has to be also differentiated from the concept of sharing (Klein 2008). Knowledge transfer is related to a conscious, purposeful process involving a one-to-one interaction, contrarily to knowledge sharing, where the knowledge owner shares his knowledge with anyone willing to use it. Knowledge sharing or

transferring can also be conscious and purposeful like in the case of a community of practice or a master-pupil relationship or, on the contrary, be unconscious or without a clear intention, like in the case of the knowledge spillovers and the local buzz referred in the literature on knowledge in clusters.

Finally, a distinction has to be made between the concepts of "collaboration" and "cooperation". A rough distinction could be expressed as follows. Collaboration and cooperation are ways in which two or more actors put in common their specific knowledge bases to attain a certain goal. The difference is that in collaboration; the goal to be attained is shared between the participating actors and in the case of cooperation, each participant works to attain his/her own goal. In other words, the logic of collaboration is "if we work together, we will reach our shared goal" (for instance, the community behind Wikipedia) whereas the logic of cooperation is "if you help me I'll help you".

1.2.2. Organizational dimension

Each of the articles that integrate the thesis focuses on a different organizational configurations. The first article deals about communities and clusters, the second analyzes mainly communities and in a minor degree, clusters, and the third, firms and communities. Taken together, the knowledge dynamics discussed in the research deal with a large diversity of organizational configurations:

- Markets
- Clusters
- Communities
- Firms

The thesis discusses the relationship between the different organizational configurations and the knowledge dynamics.

1.3. Conceptual framework

So far, the literature review has presented different theoretical concepts separately. In the conceptual framework that is presented in this section, the different aspects underlined in the literature are integrated in three models. Each of them represents a theoretical frame that will be used to study the research question of each of the three articles that compose the thesis. Taken as a whole, the research tackles issues from three broad research fields: knowledge management (including the literature on knowing communities as i.e. communities of practice), management (particularly innovation management and intro-organizational collaboration) and economic geography (specifically, innovation in urban environments) (Figure 2).

Knowledge management
(knowing communities)

- Nonaka and Takeuchi (1995)
- Agterberg *et al.* (2010)
- Amin and Cohendet (2004)
- Amin and Roberts (2008)
- Boland and Tenkasi (1995)
- Cohen and Levinthal (1990)
- Cowan, David, and Foray (2000)
- Grant (1996)
- Wenger (1998)

- Asheim and Gertler (2006)
- Brown and Duguid (2000a)
- Coe and Bunnell (2003)
- Gertler (2003)
- Henry and Pinch (2000)
- Maskell (2001)
- Bathelt, Malmberg, and Maskell (2004)

Economic geography
(innovation and cities)

Management
(innovation and collaboration)

- Howells and Roberts (2000)
- Bunnell and Coe (2001)
- Malmberg and Maskell (2006)
- Maskell and Lorenzen (2004)
- Cohendet, Grandadam, and Simon (2010)

Figure. 2. Three intersecting bodies of literature

The thesis uses research on knowledge as a transversal perspective, linking the literature on the knowledge-view of the firm and the one on the knowledge dynamics in clusters. The conceptual framework takes in account this knowledge approach as well as the different levels of analysis, from the geographical local scale to the global scale. It also considers different organizational units of analysis: communities, firms and clusters.

In general terms, the thesis aims to contribute to the understanding of how localized knowing communities contribute to the local and global knowledge dynamics. Each one of the three articles takes a different perspective to focus on a different level and unit of analysis. The first article discusses the current buzz-and-pipelines model of local and global knowledge dynamics and complements it by adding the community-based perspective. The second article, takes a knowledge-based view of clusters, to propose the conceptualization of coworking spaces as micro-clusters. Finally, the third article studies the inter-organizational collaborative dynamics within coworking spaces.

Figure 3 represents schematically the positioning of the three articles in relation with the three main literature fields talked in the thesis.

ARTICLE 1: How the local and global knowledge dynamics of localized knowing communities outside firms contribute to the innovation capacity of territories?

ARTICLE 3: How do the knowledge dynamics in coworking spaces affect inter-organizational collaborations?

Article 1

Article 2

Knowledge management
(knowing communities)

Article 3

Local level

Global level

Economic geography
(innovation and cities)

Article 2

Management
(innovation and collaboration)

ARTICLE 2: How localized knowing communities, like the ones emerging on coworking spaces, participate in the knowledge dynamics of their local environment?

Figure 3. The relationship between the articles and the current literature

The initial considerations and general scope of the thesis have been exposed above. In this section, an integrative conceptual framework is presented in order to put together the concepts derived from the literature review. The conceptual framework will be used to answer to the main research question and sub-questions.

Figure 4 represents the relationship between the three main bodies of literature that represent the theoretical base of the thesis and the three main concepts that constitute the base for the conceptual framework.
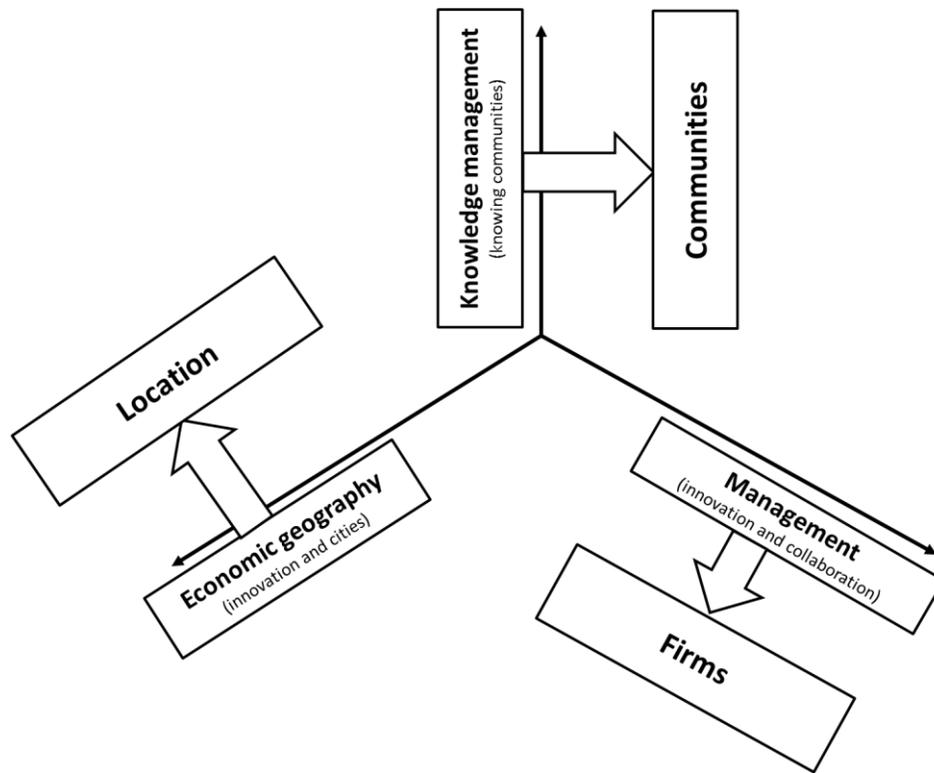
Figure 4. Relationship between current literature and concepts of the theoretical framework.

1.3.1. Conceptual framework for the third article
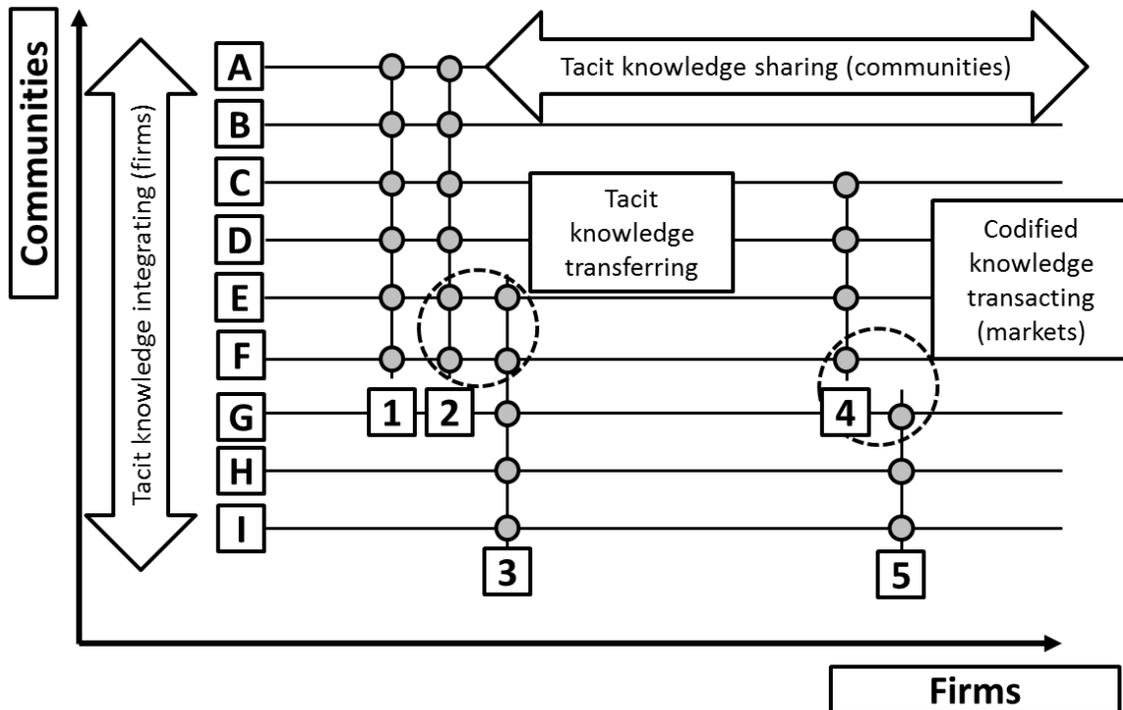
Figure 5: Conceptual framework: inter-organizational knowledge dynamics

Figure 5 is based on the matrix representation that Brown and Duguid conceptualized to explain the knowledge dynamics of Silicon Valley (Brown and Duguid 2000a). The model has been completed to include inter-firm knowledge dynamics.

In the knowledge-based view of the firm (Grant 1996), the rationale for the existence of the firm is that firms can create the optimal conditions to integrate the specialist knowledge of different individuals. Markets can only deal with transactions of codified knowledge, and even in this cases, it faces the problem of appropriability (Arrow 1971): marketing knowledge risks the unveiling of the value of that knowledge to the potential buyer before concluding the transaction. Except in the case of codified knowledge that is legally protected (by patents and copyrights), markets do not represent a convenient way to transfer knowledge. The general way to transfer tacit knowledge through markets is through the labor market, where individuals market their literally embodied tacit knowledge by signing job contractual agreements (Kogut and Almeida 1999).

Contrary to firms, that are aimed to the integration of different specialist knowledge, knowing communities focus on the knowledge sharing among their insiders. They are not hierarchical structures but horizontal self-managed configurations ruled by a system of social trust and reputation. Communities are characterized by the cognitive proximity of the members and by the openness to share knowledge. Communities are transversal configurations whose boundaries go beyond organizations.

Inter-organizational collaboration, cooperation or alliances can be convenient for different reasons (Grant and Baden-Fuller 1995, 2004). A determinant incentive to collaborate is the search of complementarities and synergies. Taking a knowledge-based view of inter-organizational collaboration, the different types of knowledge interaction are represented in Figure 5 and can be summarized as follows:

- Competition: Firms 1 and 2 are competitors as they need the same knowledge bases to develop their products. Each knowledge base is mastered by a certain community of specialists. The two firms might compete on the product market and/or on the job market, as both require the same type of specialists.

- Transaction: Firms 4 and 5 are complementary and might intend to collaborate to offer new products that they cannot develop individually, or they might have a supplier-customer relationship. They do not share a knowledge specialization and organizational capabilities. However, if the knowledge that they need to share can be embedded or codified in a product, they can interact through markets or collaborate through strategic alliances.

- Collaboration: Often, the complexity of products requires the specialization of firms and the collaborative work of several firms to launch a final product to the market. Like in the automotive industry or in the film industry, collaborations between firms are not sequential and there are no boundary objects that can integrate all the specialist tacit knowledge that is required. In this case, some degree of tacit knowledge has to be transferred between the firms to integrate their knowledge

bases. In these cases, the tacit knowledge transfer is done through the interaction of specialists of both firms that share the same knowledge base and belong to a same knowing community. In Figure 5, Firms 1 and 2 collaborate by transferring tacit knowledge among specialists of the same knowledge domain.

1.3.2. Conceptual framework for the second article

The theoretical model above presented will be used as the conceptual base for the third article, dealing with inter-organizational collaboration. The second article, will take as starting point the same conceptual base, but will focus on the spatial implications of the knowledge-dynamics of inter-organizational collaboration.

Due to its social and contextual dependence, tacit knowledge transfer benefits from co-location. Firms with related and complementary knowledge domains will benefit from co-location. In a knowledge-based view of clusters, this represents the vertical dimension (Maskell 2001). Furthermore, competing firms that share the same knowledge domains will also benefit from co-location by having access to a larger pool of specialists. Additionally, they will take advantage of the knowledge creation and transfer processes that take place within knowing communities. The agglomeration of competing firms constitutes the horizontal dimension of clusters (Maskell 2001). Thus, firms 1, 2, 3 and 4 in Figure 6 will benefit from clustering. However, firm 5 will not have a priori an incentive in clustering near the other firms as it can have access to the codified knowledge produced by firm 4 at a distance. Nevertheless, firm 5 can benefit from clustering by the contribution of the local knowing communities G, H and I to the local "buzz" of the cluster.
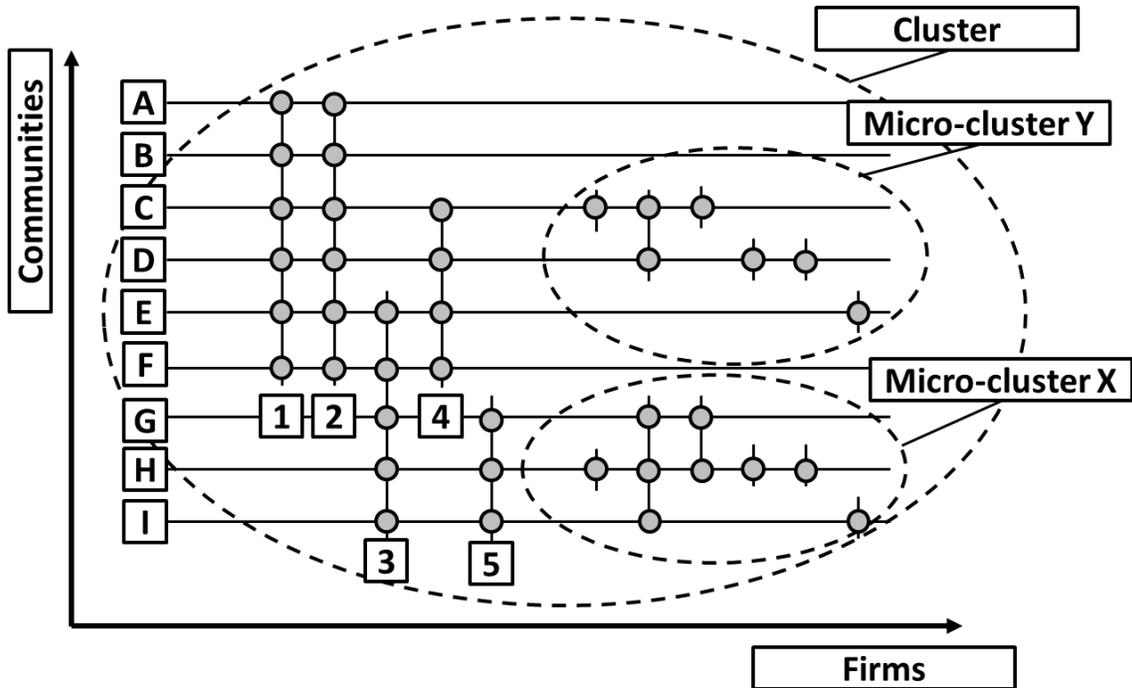
Figure 6: Conceptual framework: inter-organizational knowledge dynamics in clusters

Apart from considering the communities and the firms of Figure 5 and integrate their knowledge dynamics in the context of clusters, Figure 6 includes the concept of micro-clusters that is introduced in the second article of the thesis. As it is schematically represented in Figure 6, micro-clusters are composed of co-located micro-firms, entrepreneurs, freelancers and professionals in spaces where collaboration and knowledge sharing is encouraged. As I argue in the second article, coworking spaces are examples of micro-clusters. Bounded rationality (Simon 1982) forces each coworker to become a specialist of a certain knowledge domain and a member of the knowing community of that domain. Startups can combine complementary knowledge domains. The aggregate knowledge spectrum of a micro-cluster might represent advantages for the local knowledge dynamics. For instance, the micro-cluster X represented in Figure 6 masters the same knowledge domains as firm 5. However, the focus on community building and knowledge sharing of the micro-cluster might represent that knowledge transfer among insiders is more dynamic than between the members of the community in firm 5 and other members of the community outside firm 5.

Micro-cluster Y (Figure 6) also shows that collaboration in these spaces can accelerate and facilitate the knowledge creation and sharing in and between knowing communities outside firms. In this way, Firms C, D and E could benefit of the knowledge dynamics of micro-cluster Y, just by being located in the cluster.

1.3.3. Conceptual framework for the first article

The two conceptual models presented so far are used to the construction of a third conceptual model (Figure 7) to understand the local and global knowledge dynamics through clusters and communities.
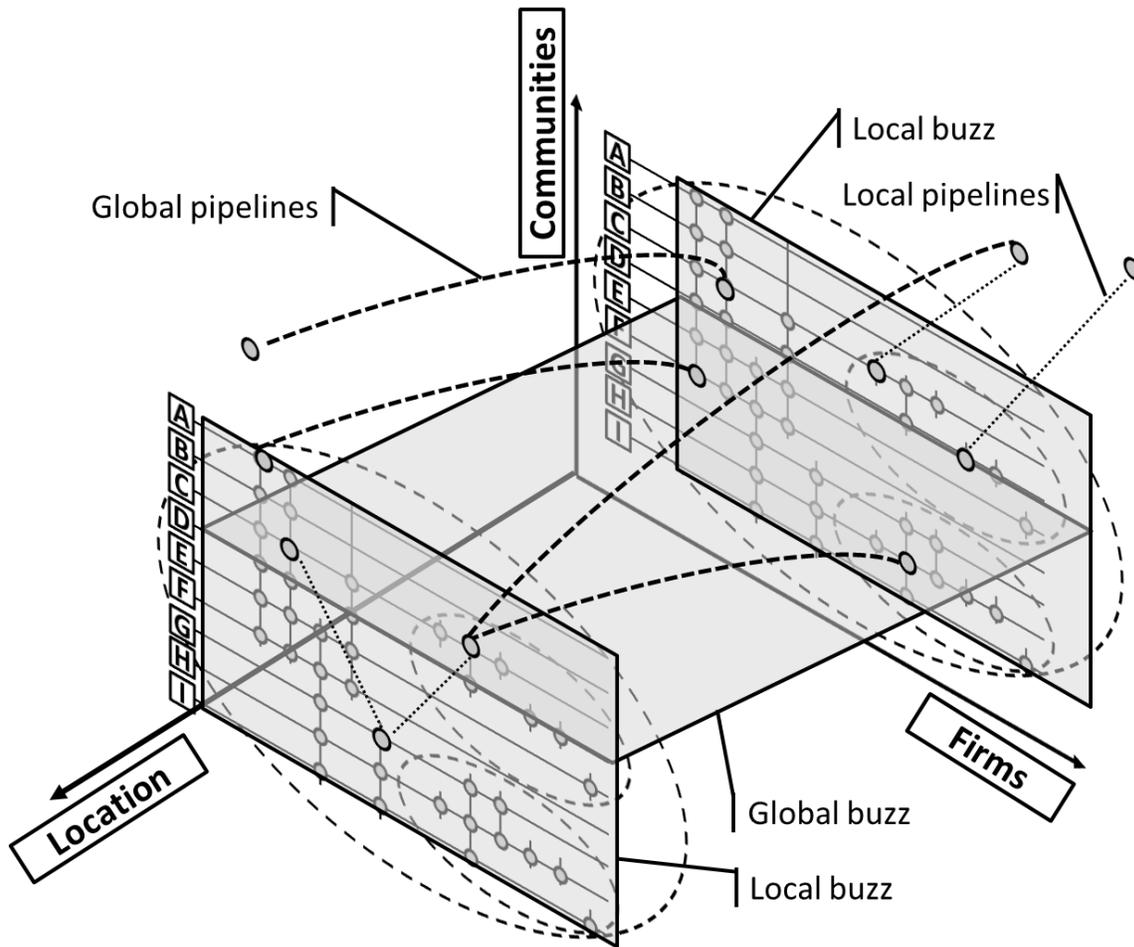
Figure 7: Conceptual framework: local and global knowledge dynamics through clusters and communities

The first article of the thesis builds on this model to contribute to the literature about the buzz-and-pipelines model (Bathelt et al. 2004) of knowledge creation and knowledge transfer in clusters.

From one side, the organizational capabilities derived from the knowledge expertise of the individuals of a certain firm, are the source of the absorptive capacities (Cohen and Levinthal 1990) of the firms. Mechanisms of knowledge coordination in firms facilitates the intra-organizational circulation of knowledge (Grant 1996). The cognitive proximity (Nooteboom et al. 2007) between insiders of local knowing communities contribute also to

the inter-organizational transfer of specialized knowledge. Furthermore, knowledge spillovers in clusters reinforce the local knowledge dynamics. Altogether, clusters are characterized by a "local buzz" consisting on shared information, gossips, ideas and knowledge. Benefiting from the buzz is mainly "automatic" for all the actors within the cluster.

The local transfer of knowledge outside the cluster might suffer from the lack of a connecting "buzz" but the institutional proximity and sharing a common language, values and regulations, might facilitate the creation of "local pipelines" (Figure 7).

From a global (or inter-local) point of view, the creation of "global pipelines" involve high costs to transfer knowledge, as dyadic relationships of trust need to be created by distant actors. The lack of different kinds of proximity (Boschma 2005) might difficult even more distant interaction. The high cost associated to the creation and maintenance of "global pipelines" is consistent with the buzz-and-pipelines model (Bathelt et al. 2004).

Nevertheless, the conceptual model (Figure 7) reinforces the main argument put forward in the first article that affirms that knowing communities play an important role in the global knowledge dynamics by creating "cognitive bridges" between members of similar but distant communities. The cognitive proximity and the sharing of values, goals and willingness to collaborate foster the creation of a "global buzz". The "global buzz", like the "local buzz", consists on an aggregation of information and knowledge accessible to all the actors involved. Contrary to the "local buzz", which is characterized by geographical proximity, "global buzz" is accessible through cognitive proximity by insiders of a knowing community.

1.4. Methodology

Considering the aim of the research, the methodology has been conceived to contribute to answer the three sub-questions and consequently, the overall research question.

Research on knowledge dynamics encounters methodological difficulties due to the complexity of human interaction and the elusive concept of knowledge flows, especially when it comes to the study of tacit knowledge. The focus on communities that are localized and that engage in knowledge sharing and collaboration provides intense and extreme examples (Eisenhardt 1989; Patton 2002) of high degree of interaction and knowledge flows, making the phenomenon ''clearly observable'' (Eisenhardt 1989). This strategy offers also opportunities of building theory (Eisenhardt 1989).

1.4.1. Research strategy

The research strategy is based on a multiple-case study. A methodology based on studies ''is most appropriate in the early stages of research on a topic or provide freshness in perspective to an already research topic'' (Eisenhardt, 1989, p.548). Case studies are also convenient when the aim of the research is to develop new theories (Eisenhardt and Graebner 2007; Patton and Appelbaum 2003).

Considering the lack of theorization and research on spaces of collaborative innovation, like coworking spaces, hacker/maker spaces or Fab Labs, a case study research appear as a suitable methodology. Furthermore, a multiple-case study offers a diversity of situations of a similar phenomenon, and at the same time provides the opportunity to study in-depth cases within their context and taking in account their complexity. This profound analysis can then allow to identify other situations where the results can be applied, facilitating the transferability of the results (Lincoln and Guba 1985).

The theoretical territory of localized spaces of collective innovation is still in its early stages, and the methodological approach of my research is inductive, aiming to describe innovation and collaboration dynamics in such communities. According to the novelty and

lack of previous theorization of the research field, an inductive, theory-building strategy from qualitative data is appropriate (Edmondson and McManus 2007).

In an attempt to enhance the richness of theorizing, I have relied on an approach that fosters "close interplay between theory and reality" (Van de Ven 2007:100) by combining established arguments from prior research with in-depth qualitative data from extensive fieldwork. Specifically, I draw on insights from 55 interviews with managers and members of different types of spaces and innovation specialists and I also did non-participant observation. My overall analytic approach was iterative and inductive, with the goal of building and refining theory from rich case study research (Eisenhardt 1989). This approach allowed me to provide support for past theorizing and research and also allow new issues to emerge. Glaser and Strauss's (1967) description of grounded theory development emphasizes such an interplay of experience, induction, and deduction. Some refer to this method as an "abductive" approach to theory building, meaning that a researcher goes "back and forth between induction and deduction" (Zahra and Newey 2009:1061). Nevertheless, in the majority of the papers in the management literature, this type of methodological approach is referred as being inductive. Inductive approaches rely on 'grounded theory' (Glaser and Strauss 1967) where theory is systematically generated from data. However, "pure induction" is extremely difficult to warrant as researchers enter the field with a certain background on the existing literature and notions of which is the theoretical focus that they plan to take. According to Strauss and Corbin (1990), it is important to enter into the research situations with some background in what they call 'technical literature'. They argue that there is no need to review all of the literature beforehand. In fact, to do that might pose obstacles to the desired process. The idea of conducting research without 'preconditions' has even been questioned (Strauss and Corbin 1990). Even if in this thesis I use the generally accepted term of inductive research, abductive research could be argued to be more pertinent. In an abductive research based on an iterative process of sense-making between observed reality and existing theory, the researcher would not need to previously identify 'all the related literature' since the empirical fieldwork parallels the theoretical conceptualization. Hence, the 'need' for theory is created in the process and progressively include it in the process.

1.4.2. Unit of analysis

The unit of analysis of the research project taken as a whole is the knowing community that might emerge on spaces of collaborative innovation. However, considering that different units of analysis might be imbricated (Yin 1984), each article focuses differently on the analysis unit and the analysis mode (Figure 8). The first article considers the community as the unit and focuses on the knowledge dynamics of the community with its environment, at a local and global level. The second article also considers the community but the analysis is centered on the intra-community knowledge dynamics and their influence at the local level. Finally, the third article focuses on the internal collaborative dynamics within the community.
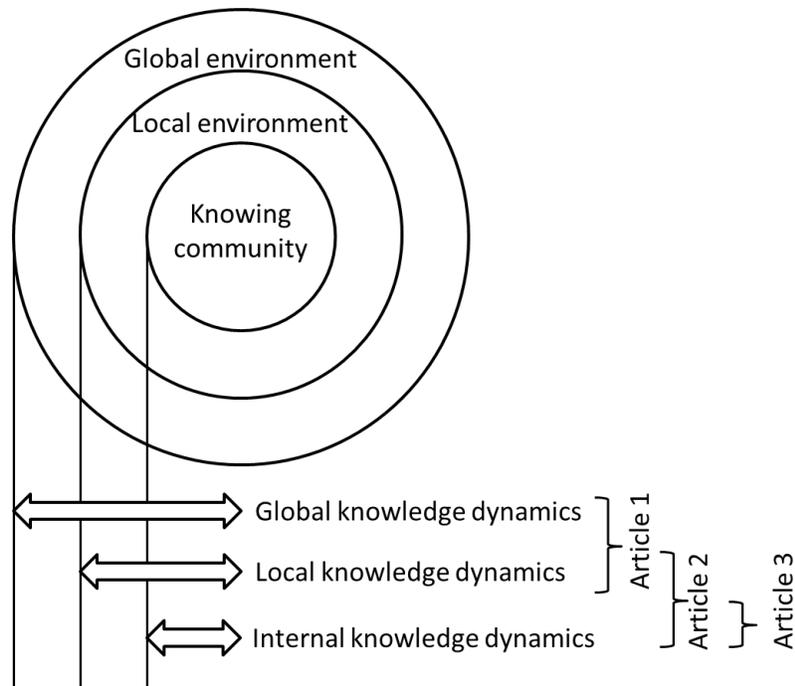
Figure 8: Unit of analysis and analysis focus

1.4.3. Sampling

The research studies the knowledge and collaborative dynamics in localized spaces of collective innovation in Barcelona. The main spaces' denominations that were identified corresponding to spaces open to the public and focusing on collaboration where: living labs, hacker / maker spaces, coworking spaces and fab labs. In Barcelona, the majority of these spaces are coworking spaces (Table 2).

	Coworking spaces	Fab Lab	Hacker / Maker spaces	Living Labs
Quantity of spaces in Barcelona	About 100	2 launched and 8 planned	Uncertain (less than 10)	7 officially recognized by ENOLL (not all open to the public)

Table 2. Quantity of spaces in Barcelona, by denomination.

Through an internet search, personal contacts and a snowball strategy, I compiled a list of 118 coworking spaces located in the city of Barcelona. All coworking spaces were contacted by email and telephone. The result was that the managers of 21 coworking spaces accepted to participate in the research.

Article 3 is based on the study of these 21 spaces to set three types of collaborative dynamics.

Article 2 focuses on the coworking spaces that were identified in Article 3 as presenting a higher degree of collaboration (type 3: relational collaboration) to study the innovation dynamics at the local level.

Article 1 illustrates the community-based model of the local-global knowledge dynamics by presenting the study of a selection of three cases of labs in Barcelona: a fab lab, a coworking space and a maker space.

The selection of the samples of Article 1 aims to identify extreme cases (Patton 2002), as they provide richer and more observable evidence on the research topic: the community-based internal, local and global knowledge dynamics.

To do so, I selected knowing communities that despite of their own particularities aimed to

maximize their interaction and knowledge exchange with its environment, both locally and globally. The selected cases fulfilled four common characteristics:

1) They are not communities within firms. This means that even though the community might depend on a larger organization, the members are not employees of a same firm and do not have the same professional profile, specialty, or educational background.

2) They have low entry barriers for new members. They are communities that are open to the general public (even if in some cases there is a monthly fee to be paid).

3) They explicitly encourage the free sharing of knowledge, information, and tools among their members on a non-proprietary type of collaboration.

4) They belong to a certain "movement" or trend that is observable at an international level. In this way, the chances of generating global pipelines increase by the cognitive proximity of distant communities of the same global movement.
Following these four criteria, three communities located in Barcelona purposely considering their openness to knowledge transfer both locally and globally.

The global movements that we have selected are the "fabbing" movement (Troxler 2010), the "coworking" movement (Spinuzzi 2012) and the "hacker / maker" movement (Gershenfeld 2005; Maxigas 2012), as they all represent global trends. The "living lab" movement has been discarded because in my exploratory research, I could not clearly identify an emergent, bottom-up self-managed community in the only Living Lab that is open to the public in the Barcelona metropolitan region (Citilab in Cornellà).
I have selected the two Fab Labs that are currently working (in Poblenou and in Les Corts) and one maker space. A higher number of coworking spaces were included in the study because there is a greater number of coworking spaces than other kind of spaces of collaborative innovation.

The initial selection of the spaces has not been random (Eisenhardt 1989) and corresponds to a sample type (Patton 2002). The goal was to select the spaces that would show the more intensive knowledge dynamics and collaboration between members and between the community and their environment at a local and global scale. The criteria were defined according to four aspects:

- The date when the space was inaugurated. The rationale is to assume that recently launched spaces would have less local embeddedness and would have collectively created less global links. Also, the process of community building would be in an initial stage of the evolution. Thus, the selected cases have been launched in 2007-2010.
- The number and diversity of members. A large quantity of coworkers raises the possibilities of collaborations, diversity of knowledge bases and the number of external links, both at a local and a global scale.
- Quantity and frequency of events open to the public. This criterion reflects the will of the organizers to create local knowledge flows and to dynamize the community.
- The external origin of founders (either individuals or a company). The rationale is that in spaces associated to an existing international network, local members would build global links easier and share knowledge with distant actors.

1.4.4. Sources of data

The research is mainly based on two sources of data: semi-structured interviews, and direct non-participant observation. Secondary data like the content of the spaces' web pages, online forums and discussion mailing lists was also taken in consideration.

1.4.4.1. Semi-structured interviews

The main data source is based on semi-structured interviews to managers of the spaces and members of the selected communities (see Table). Interviews lasted for about 45 minutes

on average, duration ranging from 30 to 120 minutes. They were recorded (with explicit permission) and transcribed verbatim.

In order to contextualize the studied phenomenon in its institutional, socio-political and geographical dimensions, some policy makers and specialists of the recent evolution of the innovation movements in Barcelona were interviewed as well (see Table 3).

Nr	Organization / Individual	Type	Interviews (n=55)	Article 1	Article 2	Article 3
1	CW1	Coworking Space Barcelona	2 managers		X	X
2	CW2	Coworking Space Barcelona	1 manager			X
3	CW3	Coworking Space Barcelona	1 manager (2 times)		X	X
4	CW4	Coworking Space Barcelona	1 manager			X
5	CW5	Coworking Space Barcelona	1 manager			X
6	CW6	Coworking Space Barcelona	1 manager and 4 members	X	X	X
7	CW7	Coworking Space Barcelona	1 manager			X
8	CW8	Coworking Space Barcelona	1 manager			X
9	CW9	Coworking Space Barcelona	1 manager			X
10	CW10	Coworking Space Barcelona	1 manager			X
11	CW11	Coworking Space Barcelona	1 manager			X
12	CW12	Coworking Space Barcelona	1 manager			X
13	CW13	Coworking Space Barcelona	2 manager			X
14	CW14	Coworking Space Barcelona	1 manager			X
15	CW15	Coworking Space Barcelona	1 manager			X
16	CW16	Coworking Space Barcelona	1 manager			X
17	CW17	Coworking Space Barcelona	1 manager			X
18	CW18	Coworking Space Barcelona	1 manager			X
19	CW19	Coworking Space Barcelona	1 manager			X
20	CW20	Coworking Space Barcelona	1 manager (2 times)		X	X
21	CW21	Coworking Space Barcelona	2 managers		X	X
22	FL1	Fab Lab Barcelona	3 managers, 2 members	X		
23	MS1	Hacker / Maker space Barcelona	1 manager, 4 members	X		
24	CW-INT-1	Coworking Space Brussels	1 manager			
25	CW-INT-2	Coworking Space Madrid	1 manager			
26	CW-INT-3	Coworking Space Florence	1 manager			
27	CW-INT-4	Coworking Space Berlin	1 manager			
28	Jordi Colobrans	Specialist (researcher UB, i2cat)	1 interview			
29	Artur Serra	Specialist (researcher i2CAT)	1 interview			
30	Enric Senabre	Specialist (practitioner)	1 interview			
31	Matías I. Zarlanga	Specialist (researcher UB)	2 interviews			
32	Ramon Sangüesa	Specialist (researcher UPC)	3 interviews			
33	Ricard Benítez	Policy Maker (Catalan Gov.)	2 interviews			
34	Ricard Faura	Policy Maker (Catalan Gov.)	1 interview			

Table 3. Summary of data sources: interviews

1.4.4.2. Non-participant observation

The second main source of data was non-participatory observation of the community activities (Lee 1999). In total, I conducted about 30 hours of formal observation and several more of informal observation. Following observations, I took notes that helped me to build a more comprehensive understanding of the environment, the knowledge dynamics and interactions between the members of the communities. Table 4 summarizes the spaces where took place the observation.

Nr	Organization / Individual	Type	Non-participant observation (Total: 33h)
1	CW1	Coworking Space Barcelona	3h
2	CW3	Coworking Space Barcelona	4h
3	CW6	Coworking Space Barcelona	8h
4	CW20	Coworking Space Barcelona	4h
5	FL1	Fab Lab Barcelona	8h
6	MS1	Hacker / Maker space Barcelona	6h

Table 4. Summary of data sources: Non-participant observation

Observation is a highly valued and effective research method. It enables researchers to improve their understanding of many aspects of social interaction. In my research, non-participant observation has been used in combination with other research methods, mainly interviews to increase the validity of my results. Non-participant observation has allowed me to observe what people actually do, and to contrast it to what they think they do, to what they say they do, or would like others to think they do.

Non-participant observation has much value in capturing social action and interaction as it occurs, however, this technique presented some limitations in my research. One of the main limitations was linked to the fact that I was the only observer; consequently, the observations were reliant on my subjective understanding and selection. Even though it is not the observers' intentionality, they are constrained by their own culture, language and interests. In this base, non-participant observation might be criticized for not being an objective research method (Richer 1974). One possible way to overcome would have been

to use multiple observers. Another would have been to record on video the observations to be analyzed by different researchers. None of these two solutions were put in place due to technical and budgetary limitations. Instead of video recordings, field notes and reflections were written during the observation. However, field notes present the limitation of being partial and often incomplete due to selectivity, risking resulting superficial (Cooper 1974). Another important limitation of non-participant observation is the influence of the observer on the behaviors of the observed individuals. Similar to the Heisenberg's uncertainty principle in quantum mechanics, where the act of observing a phenomenon modifies the phenomenon observed. This has also been named the observer effect, the 'Hawthorne effect' (Mayo 1945), or the "guinea pig effect" referred by Lincoln and Guba (1985) by which participants may change their behaviors because they are aware they are being observed. To overcome this problem, it is crucial to be able to distinguish normal behavior from changed behavior that may occur as a result of researcher presence. Prolonged engagement by investing time within the research environment may be useful in order that the observed individuals get used to the observer and develop trust, and in parallel, the observer learns about the culture, checks for distortions that may be introduced by his/her presence (Lincoln and Guba 1985).

In the case of this research, the observer effect was reduced by the fact that the majority of the non-participant observation was done in coworking spaces. By my cultural, educational, and professional background, to integrate a coworking space as a coworker for some days was perceived as natural for other coworkers.

Previous research on observation methods has indicated the fundamental need for trust between the observer and the research subjects (Cooper, Lewis, and Urquhart 2004). In our research, the relation with coworkers offered instant access and trust, as the general atmosphere of the spaces focus on openness and sharing and not on a high degree of secrecy and privacy. Our research did not transcend the sphere of the private and remained in the public sphere, overcoming problems of sustained access to subjects, as has been largely documented (Hammersley and Atkinson 1989; de Laine 2000). Our research followed the suggestion of de Laine (2000:107–108) of entering as an insider and not an outsider to gain legitimate access. For the non-participant observation study, the coworking

spaces' managers granted permission for the study, on the understanding that coworkers would be observed to obtain a better understanding of their behavior and collaborative practices. With the exception of managers, I did not identify myself as a researcher but as a new member of the space. The non-participant observation study was eased by the collegiality of the work situation and the predisposition of the space members to share. Although the coworkers quickly became accustomed to the observer, they often found the situation novel and engage in conversations with the observer. However discrete the observer might wish to be, the fact to observe others while just being as another member, lead other coworkers to chat to the observer. These interactions with members represented difficulties to disappear in the environment as part of the "wallpaper" and represented an obstacle to detailed observation.

Field notes were structured around guidelines (Hammersley and Atkinson 1989) including the spatial and temporal aspects; the goals, feelings, and activities of the actors; and the physical objects that are present in the situation. Special attention was put in all situations dealing with knowledge sharing or collaboration between coworkers.

Ideally, the observation periods should have been longer than one day or two, but time constraints on the study meant that longer periods were not feasible. In addition, the environment in which the coworkers were working was sometimes unstable, with coworkers leaving and entering without fixed schedules and different types of activities taking place simultaneously.

1.4.5. Validity

Case studies help to illustrate the specific aspects and are used as ways to persuade (Siggelkow 2007). The literature on qualitative methodology acknowledges that the quantity of selected cases do not warrant the validity or the replicability of the results. In this sense, the quality of the empirical data (Alvesson and Kärreman 2011) or the data richness (Lincoln and Guba 1985) might represent a more important aspect. There is not an ideal number of cases. Eisenhardt (1989) proposes to take between four and ten. Creswell (1998) suggests four as a convenient number.

In our research, a total number of 23 cases have been analyzed. Three cases have been used for Article 1, five for Article 2, and 21 for article 3. The cases presented in Article 1 and 2 have been studied in more depth (including direct non-participant observation).

Overall, the research design has intentionally focused on diverse cases with two main intentions:

- To capture the diversity of types of communities. To do so, three types of communities have been selected: fabbers, coworkers and makers (Article 1).

- To search for the replicability of results in the case of coworking spaces. In this sense, common selection criteria have been established, as it has been mentioned above.

Our the research, I had access to different information sources and I interviewed local policy makers and specialists of the innovation in Barcelona that increased the credibility of the constructions (Lincoln and Guba 1985).

1.4.6. Ethical considerations

The research project has been submitted to the HEC Montréal ethical committee. The persons that have been interviewed were asked to sign an agreement form. The anonymity of the organizations was preserved and the data was depersonalized. The members of the different spaces were not employees of the same firm, and they were not linked by hierarchical structures, so the risk of negative consequences for the interviewees was reduced.

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Chapter 2: Knowing communities and the innovative capacity of cities

Abstract

The aim of this paper is to emphasize the role that actors outside firms, especially communities, play in facilitating both the local and the global knowledge dynamics, thus contributing to the innovative and creative capacity of cities. The proposed community-based model complements the buzz-and-pipeline model (Maskell et al. 2006; Bathelt et al. 2004) that claims that clusters of economic activity need both a rich "local buzz" and the creation of "global pipelines" with external actors to increase their innovative capacity. The paper argues that the knowledge transfer between distant similar communities is facilitated by the cognitive proximity that bonds members of knowing communities and that appears more determinant than geographic proximity. This community-based model is empirically illustrated by a three-case study on different knowing communities in Barcelona (of fabbers, coworkers and makers).

Keywords:

Knowing communities; local buzz; global pipelines; coworking spaces; makerspaces; Fab Labs

2.1. Introduction

The foundations of the contemporary economic geography literature lay on the evidence that proximity matters. Co-location allows economic actors to interchange and share knowledge and information, both in traded and untraded ways. The knowledge dynamics that take place within concentrations of economic actors have been acknowledged to both facilitate collaboration and increase competition, thus encouraging innovation and consequently regional competitiveness (Porter 2000; Maskell & Malmberg 2007).

However, the research has shown that the most innovative cities and regions are the ones that not only facilitate the circulation of knowledge locally, but also are able to integrate external knowledge in their local innovation processes. Research has shown that organizations need to be capable to integrate the local knowledge circulating in their environment and simultaneously be able to detect, absorb, adapt and use the external knowledge that has been created elsewhere, in other cities or regions. This combination between integrating the "local buzz" and, at the same time, creating "global pipelines" with distant economic actors contributes to integrate diverse and novel knowledge in organizations (Grabher 2001; Storper & Venables 2004; Bathelt et al. 2004; Maskell et al. 2006).

The buzz-and-pipeline model (Bathelt et al. 2004; Maskell et al. 2006) has focused on the inter-firm relationships, ignoring the role that other actors outside firms play. Knowledge-sharing configurations that transcend firms' boundaries, like the different types of communities (Brown & Duguid 2000; Boland & Tenkasi 1995; Amin & Roberts 2008), might not have an economic goal and be even far from business logics but nevertheless they contribute actively to the localized dynamics of knowledge creation (Gertler 2003; Morgan 2004; Coe & Bunnell 2003; Henry & Pinch 2000). Even though the buzz-and-pipeline model recognizes the role of knowledge communities, particularly communities of practice, in the build of the shared institutional structure at the local level, it fails to explain how these local communities outside firms contribute to the local buzz. Furthermore, it also ignores the role of such communities in the creation of global pipelines.

This paper addresses this gap by analyzing the geographic impact of the knowledge dynamics among communities, both at a local and global level. The members of such emergent and autonomous communities are characterized by having a high cognitive proximity and by responding to a relational system based on social trust and reputation. This allows the communication among insiders without investing high costs in the creation of dyadic trustful relationships and facilitates their participation in the local buzz but also in the creation of global pipelines.

This view contrasts the buzz-and-pipeline model, that affirms that the costs associated to the participation in the local buzz are low and just depends on "being there" (Gertler 1995), contrarily to the creation of global pipelines, that require a high investment in their construction and maintenance. In opposition to these arguments, this article argues that insiders of knowing communities share knowledge through global pipelines in a similar way that they do by their participation in the local buzz: just by being member of a community. In other words, just by belonging to a local community, an insider will have access to the shared knowledge among members of similar but distant communities, thus reinforcing the notion of a global buzz (Bathelt & Schuldt 2008; Bathelt & Schuldt 2010; Schuldt & Bathelt 2011; Bahlmann et al. 2009). By sharing codes and values, communities reduce the costs associated to knowledge sharing among members independently of their location. In this way, combining the high degree of embeddedness (Granovetter 1985) of communities at the local level, and the facility of integrating global networks, communities offer optimal configurations to contribute to the local and global knowledge transfer and in consequence, contributing to the innovative capacity of urban agglomerations.

In this article, I argue that, even if the concept of knowing communities has been mainly explored in an organizational and knowledge management perspective, it offers a conceptual new point of view to understand the knowledge creation dynamics both at the local and global level. Thus this article contributes to the economic geography literature first, by focusing in actors outside firms that contribute to the creative and innovative character of cities and second, by underlining the important role of communities in the local and global knowledge dynamics.

The article tackles the research question: "How do knowing communities outside firms contribute to the knowledge dynamics at a local and global level?"

The structure of the paper is the following:

Firstly, I review the literature that has focused on the role of tacit knowledge at a local and at a global level and on the buzz-and-pipeline model. Secondly, the concepts of cognitive distance, absorptive capacity, and localized capabilities are discussed, in order to better understand the role that knowing communities play in the local and global knowledge dynamics. I schematize my arguments by a simple model that is illustrated by three cases of different communities located in Barcelona. Finally, the last section summarizes the paper's contributions and exposes the conclusions.

2.2. Tacit knowledge, local buzz and global pipelines

The importance of tacit knowledge in the process of knowledge creation in organizations was put upfront by Nelson and Winter (1982) and later by Nonaka and Takeuchi (1995). Due to its stickiness to the geographic context, the crucial role of tacit knowledge has also been acknowledged in the literature on economic geography (Gertler 2003; Lawson & Lorenz 1999; Howells 2002; Morgan 2004; Maskell & Malmberg 1999a). The general assumption is that by its difficulty of being codified and its dependence on context-specificity, tacit knowledge is more difficult to transfer through distance. It is by constant, direct and face-to-face interaction between actors that tacit knowledge can be shared, interpreted and used. Thus, in situations where intensive tacit knowledge transfer takes place, economic actors will tend to locate in geographical proximity. According to this view, codified knowledge, contrary to tacit knowledge, can be acquired relatively intact at a distance by the effect of its 'ubiquitification' (Maskell & Malmberg 1999b) and consequently, actors could avoid proximity. However, the concept of "tacit=local" and "codified=global" has been challenged from different perspectives.

Firstly, the apparent dichotomy and differentiation between these two kinds of knowledge has been questioned as "each form of knowledge can often be used as an aid in acquiring the other" (Cook & Brown 1999, p.385). The interdependency of tacit and codified knowledge was also underlined by Nonaka and Takeuchi (1995) in their model of knowledge creation in organizations.

Secondly, different industries use different knowledge bases, some needing a higher degree of tacitness than others but nevertheless, this does not seem to be related to the degree of geographic concentration. There is no evidence that industries based on a more codified knowledge (i.e. analytical knowledge) show a lower geographical concentration that industries based on more tacit types of knowledge (i.e. symbolic knowledge). For instance, as Asheim and Gertler (2006) remarked, biotechnology despite using extensively analytical knowledge is developed in a small number of highly clustered centers around the world, contributing to the idea that codified knowledge is also highly "sticky" circulating in a large degree there where it has been produced.

Thirdly, tacit knowledge can also be transmitted through distance by the temporary relocation of individuals. For instance, by participating to trade fairs, congresses, conferences. and other events (Bathelt & Schuldt 2010; Schuldt & Bathelt 2011) actors can transfer their locally-acquired tacit knowledge to other actors externally located. At the same time, they can absorb external knowledge by participating to these "temporary clusters" (Bathelt & Schuldt 2008; Maskell et al. 2006; Maskell et al. 2004) that they later will feed into the common knowledge pool of their local environment. In this way, tacit knowledge circulates through long distances by "global pipelines" and contributes to enrich the "local buzz" (Bathelt et al. 2004).

The buzz-and-pipeline model (Bathelt et al. 2004; Maskell et al. 2006) argues that a combination of a rich "local buzz" together with the creation and nurturing of "global pipelines" will ensure the innovation capacity of a territory. Local buzz (Storper & Venables 2004) refers to "the information and communication ecology created by face-to-face contacts, co-presence and co-location of people and firms within the same industry and place or region" (Bathelt et al. 2004). Similar concepts have been referred as "local broadcasting" (Owen-Smith & Powell 2004) "noise" (Grabher 2002a). Buzz is "largely 'automatic'" (Bathelt et al. 2004) and all collocated actors benefit from this shared knowledge and information. They do not have to do a voluntary and intentional effort to profit from the information and knowledge of the buzz. In opposition, the creation of "global pipelines" (the extra-local linkages between two distant actors) implies a cost of creating and maintaining such networks. These "pipelines" have been acknowledged as being crucial to transfer external knowledge, in particular tacit, to the local environment thus producing local growth (Owen-Smith & Powell 2004; Grabher 2002b; Scott 2002). However, what remains unexplained in the buzz-and-pipeline model is why actors can take a passive role and still be able to profit from the knowledge embedded in the "local buzz" but have to take an active role to profit from the knowledge in the "global pipelines". In other words, why the costs related to the access and identification of new useful knowledge is higher in the case of global pipelines than in the case of the "local buzz". The next section is concerned with this question.

2.3. Cognitive distance, absorptive capacity, and localized capabilities

To be exposed to new knowledge is not a sufficient condition to take advantage from it. Absorptive capacity (Cohen & Levinthal 1990) is required for detecting, understanding and integrating the new knowledge that can potentially be acquired both locally or globally through the action of the buzz or pipelines. The efficiency of the knowledge transfer, especially in the case of tacit knowledge, depends not only on the availability of such knowledge but also on the cognitive distance (Nooteboom 2000) between interacting individuals. Research on learning dynamics has shown that the best conditions for learning are when (a) the knowledge bases of the two actors are different enough in order that they both gain new knowledge in their interaction, and (b) their cognitive structures are not too different in order to find a common ground on which communication is fruitful. A balance has to be reached to attain an optimal cognitive distance (Nooteboom et al. 2007).

In the case of the "local buzz", the cognitive, institutional and geographic proximity will ensure that the actors can take advantage of the knowledge embedded in their local context. In the case of the "global pipelines", the conditions are quite different: the reduced geographical proximity and other types of proximity, like institutional and organizational, might difficult the communication between actors. However, cognitive proximity can take a major role and substitute the absence of geographical proximity to allow communication and understanding between two actors (Boschma 2005).

From an organizational point of view, the cognitive distance between the members of different organizations will lead to different absorptive capacities (Cohen & Levinthal 1990). Depending on the absorptive capacity developed over time, firms have the ability to recognize, absorb and use successfully external knowledge. In other words, the capacity of a firm to develop and commercialize new products and services will depend on the past developments and their own investments in knowledge creation. Firms' capabilities are developed over time and embedded in the organization in the form of routines and knowledge. Organizations have specific capabilities that are the base to their competitiveness and represent their resources to be differentiated from their competition.

In a similar way, the literature on evolutionary economic geography has underlined the

path-dependency of the innovation in regions, based on their localized capabilities (Maskell & Malmberg 1999b; Maskell & Malmberg 1999a) derived from the combination and recombination of new knowledge that they have acquired considering the absorptive capacity of local firms. The detection, understanding, acquisition, and exploitation of new knowledge, especially tacit knowledge, can only be accomplished if there is a cognitive proximity with the knowledge creator that allows the disembedding of the original knowledge context.

Being the localized capabilities of a territory dependent on the absorptive capacities of the firms and organizations that configure the local environment, it is a key element to consider how the external knowledge is absorbed and recombined with the existing knowledge embedded in local firms to understand the innovation capacity of territories.

Considering a social-based construction of knowledge that is developed in the everyday practice and interaction of individuals, the concept of knowing communities gain a special interest in order to understand the abilities of territories to develop their innovation capacity.

2.4. Communities and knowledge dynamics

Knowledge is dependent on the context. Its meaning and interpretation might change depending on the context knowledge is created and shared. Joining the activity-theory perspective of knowledge creation through practice, the point of view of Brown and Duguid (2000; 2001) is that knowledge is developed on the praxis of everyday work, with the influence of improvisation and experimentation. In this perspective, knowledge, beyond being an individual's property, is considered a social construction. It is by interaction that individuals collectively create knowledge.

Research on communities of practice has experienced an explosion since the publication of Wenger's seminal book (Wenger 1998). The extended use of the term community of practice has been applied to multiple groups, contributing to the vagueness of the meaning (Amin & Roberts 2008). Beyond the concept of communities of practice (Brown & Duguid 2000; Wenger 1998), a multiplicity of terms have been used in the literature to refer to communities of shared practice and their knowledge outcomes, like constellations of practice (Faulconbridge 2010; Wenger 1998), collectivities of practice (Lindkvist 2005), networks of practice (Brown & Duguid 1991; Wenger et al. 2002; Tagliaventi & Mattarelli 2006; Teigland 2003), epistemic communities (Knorr-cetina 2009; Cowan et al. 2000; Steinmueller 2000), professional communities (Amin & Roberts 2008), virtual communities (Amin & Roberts 2008), knowledge-intensive communities (Cohendet et al. 2004), knowledge communities (Henry & Pinch 2000) or transnational communities (Saxenian 2006; Coe & Bunnell 2003).

The literature on such communities has opened a new research perspective on the processes of knowledge creation and innovation in economic geography (Gertler 2003; Howells 2002; Malmberg & Maskell 2006; Amin & Cohendet 2004; Coe & Bunnell 2003; Henry & Pinch 2000) by underlining the social aspect of knowledge creation and diffusion and the contextual and localized character of the (tacit) knowledge dynamics (Lave & Wenger 1991; Wenger 1998).

It is not the intention of this article to deepen in the definition of typologies of communities

but instead to focus on the knowledge dynamics of localized communities and their influence on the knowledge flows in a local and global context. In this paper, the use of the term knowing communities (Boland & Tenkasi 1995; Amin & Roberts 2008) has been chosen to consider a broad concept that can include terms that refer to localized communities as well as communities composed of distant members. I use the term knowing community referring to a relatively stable group of "members working in close proximity to one another, in which identity formation through participation and the negotiation of meaning are central to learning and knowledge generation" (Amin & Roberts 2008, p.355). This broad definition does not necessarily imply face-to-face interaction, the term proximity referring not only to geographical proximity but to other types of proximity (Boschma 2005; Bouba-Olga & Grossetti 2008), so it also includes concepts like networks of practice or virtual communities. Therefore, the analysis will be centered on the different practices and contexts of the knowledge creation, transfer, combination, and sharing within knowing communities, both localized and geographically dispersed.

Beyond situated practices and local knowledge transfer, knowing communities have the ability of transferring knowledge externally through their cognitive proximity to members of distant but similar communities, like has reflected the literature on non-localized communities, referred to as constellations of practice (Wenger 1998; Faulconbridge 2010), networks of practice (Tagliaventi & Mattarelli 2006; Teigland 2003; Agterberg et al. 2010), or virtual communities (Amin & Roberts 2008; Huysman & Wulf 2005; Kavanaugh et al. 2005).

Knowing communities present two characteristics: on the one hand, they are embedded in their local environment by creating social networks that transcend the boundaries of organizations and on the other hand, they are able to interact with external sources of knowledge by keeping contact with their external social network.

Geographical proximity is neither a sufficient nor a necessary condition for optimal communication (Boschma 2005). Cognitive proximity might complement or even replace

geographical proximity. Individuals that are not co-located but have cognitive proximity might have a more productive dialogue than other actors in geographical proximity. Therefore, inter-regional and international social networks of peers might generate a more significant knowledge transfer than localized interactions. From this view, the local and global social networks generated by knowing communities might represent important sources of external knowledge and at the same time, a way to diffuse local knowledge to other distant actors. These distant connections within communities act as global pipelines of knowledge but are, however different from the ones described in the buzz-and-pipeline model. Whereas Bathelt *et al.* (Maskell et al. 2006; Bathelt et al. 2004) argue that global pipelines are created in a high degree by temporal geographical proximity of individuals during the participation to congresses, fairs and similar events, this article argues that the global pipelines can more importantly be generated by the cognitive proximity between community members.

Following this view, local and global knowledge dynamics generated within communities are not so radically different as Bathelt *et al.* affirm. According to their model, the "global pipelines" work in a very different dynamics compared to the "local buzz". Trust has a key role in selecting a distant partner and in deciding the degree and the scope of the knowledge that will be shared. Bathelt *et al.* argue that, in the case of "local buzz" there is a shared trust with the other local agents whereas in the case of the creation of "global pipelines" trust has to be generated through a purposeful and costly relationship building process. In the case of communities however, the presence of a system based on shared social trust and reputation makes that even in virtual and distant interactions between members, global knowledge pipelines can be generated at a low cost.

In the process of trust building, cognitive proximity appears as being more important than geographical proximity, as it is the case of virtual communities (i.e. networks of practice), where the members share a set of values, practices and feelings of identity and belonging (Wenger 1998) allowing a more fluid communication and the knowledge transfer. These arguments are aligned with Amin and Cohendet (2000; 1999) that argue that organizational or relational proximity and the fact of sharing similar occupations and practices play a more important role than co-location in communities. According to them, research has "under-

estimate the degree to which communities of practice bridge the divide between formal and informal learning, between situated and corporate-wide goals, and between exploration of competences and exploitation of routines" (Amin & Cohendet 2000). Following this perspective, communities gain a crucial importance in the inter-regional transfer of tacit knowledge differing from the learning region approach that underlines the intimate relation between for tacit knowledge and co-location. Similar arguments have been put forward to explain that concepts like communities of practice (Wenger 1998) initially developed to explain localized environment of situated learning (Lave & Wenger 1991) have been extended to concepts like networks of practice. These virtual networks show similar knowledge dynamics to the ones observed in localized communities with the difference that members in a virtual network are in distant locations. Knowing communities present two different and apparently contrary characteristics: on one side, they are deeply embedded in their local context and, on the other side, they can re-contextualize their knowledge in a geographically distant but similar cognitive context in what Coe and Bunnell (2001) call the "de-territorialisation of closeness".

2.5. Empirical study

2.5.1. Research context

According to Bonet (2009), culturally vibrant cities are not necessarily cities that have a rich historical and cultural heritage, but cities with a strong cosmopolitan spirit. These cities highlight their heritage to promote their local cultural life, bringing together local and foreign public. They also allow the development of cultural and creative industries, diversified and complementary networks that contribute to renovate old specialized entrepreneurial traditions. Similarly, these cities together create a variety of creative initiatives connected to the local and international level through networks formed by creators, entrepreneurs, event organizers, associations, institutions, etc.

Based in the above description, Barcelona can be considered a culturally vibrant city that combines its strong local cultural roots with an international character (Bonet, 2009). Barcelona showed an ability to extract the value of socio-cultural heritage that contributed to create what is called the "Barcelona model" (Monclús, 2003).

The attractiveness of the city for foreign professionals and tourists has also been reinforced by the organization of major events like the Olympic Games in 1992, the Forum of Cultures 2004 or the celebration of the last Mobile World Congress. The Olympic Games helped to catapult Barcelona as a tourist destination (in the period 1992-2007, the number of tourists has almost quadrupled), but they also served as a catalyst to equip the city with modern communications infrastructure, open the city to the sea and renew old industrial areas (such as Poblenou, which gave rise to the area of innovation @ 22) (Pareja Eastaway *et al.,* 2008a).

Barcelona has also been chosen as the destination for many foreign professionals, who were attracted by the good climate, the Barcelona brand and the socio-cultural environment. These professionals are mainly located in the vibrant and active central districts, such as the Gothic Quarter, El Born and El Raval, or in the neighborhood of Gràcia (Pareja Eastaway *et al.,* 2008b). However, the opportunities to enter the labor market in the region have been limited for many of these professionals due to the local character of most firms. Despite the

efforts of public institutions to integrate foreign talent in local dynamics, they often prove inadequate (Leon, 2008). As it is the case of coworking spaces, often private initiatives offer to foreign professionals the opportunity to develop their work by. These collaborative spaces offer them opportunities to meet other local professionals, contributing to its local integration at the social and professional levels.

Although Barcelona is a very attractive city for the international community, local institutions not always respond to expectations resulting in insufficient interactions between foreign professionals and companies on one side and local professionals, firms and institutions on the other (Leon, 2008). This is accentuated by the lack of a strong entrepreneurial base, a lack of venture capital firms to help funding start-ups and a reduced number of large global Catalan or Spanish companies. In addition, the Catalan language is often a barrier that difficulties an agile communication between foreigners and locals, especially taking into account the fact that English is not fluently spoken by a large part of the population. The lack of significant economic and political status adds difficulties to the integration of large international companies (even national) that rather prefer to locate their headquarters in Madrid than in Barcelona. However, some large companies have their creative department in Barcelona attracted by the cultural image and inspiring environment of the city.

Barcelona is one of the world capitals of architecture, internationally recognized for its architects (including Gaudí) and Planners (as Cerdà), but also for its prestigious schools of architecture which annually attracts hundreds of foreign students through international exchange programs. International creative communities of the city are often developed around these centers. For example, Fab Lab Barcelona is dependent on a school of architecture. It was created to meet the need of a prototyping workshop for many architects and designers.

Communities also emerge through the idiosyncrasy of the Mediterranean countries in general and Barcelona society in particular. One of the characteristics of Catalan society is its highly associative nature. Voluntarism and citizen participation, cultural events and festivals in the streets are common in Barcelona. In contrast to American cities or Central European cities, Barcelona is a compact city where all neighborhoods show a lively mix of

business, leisure and everyday life. The mixed use and the urban density make that different groups of people (workers, children, neighbors, students, retirees,...) have frequent interactions on the city streets. The high density of meeting venues (cafes, bars, restaurants,...) and common social habit of using them, also facilitate the interactions of various types of people.

Finally, Barcelona is a source of inspiration and creativity for communities that create both local and global networks. These communities emerge through the social interaction based on the face-to-face frequent contacts that take place in the numerous public spaces all around the city. However, the interactions between international and local communities develop rather independently of public policies and institutions (Leon, 2008).

2.5.2. Methodology and data

Given the exploratory nature of the research question; I conducted research in communities engaged in knowledge sharing at a local and global level. Inductive, qualitative research strategies are particularly recommended for this kind of exploratory research (Glaser and Strauss, 1967).

2.5.2.1. Sample

To illustrate the above arguments, this section presents empirical evidence of the knowledge dynamics within different knowing communities located in Barcelona.

The research is based on the study of a purposive sample of three cases using a qualitative methodology. Due to the explorative character of the research, I have focused on extreme cases (Patton 2005), as they provide richer and more observable evidence on the research topic: the community-based local and global knowledge dynamics.

I have identified knowing communities that despite of their own particularities focused on maximizing their interaction and knowledge exchange with its environment, both locally and globally.

The criteria to consider the cases as extreme have been based on the communities of practices aiming to increase the knowledge sharing and to minimize the exchange friction with its local and global environment. To do so, all selected cases fulfilled four common characteristics:

1) They are not communities within firms. This means that even though the community might depend on a larger organization, the members are not employees of a same firm and do not have the same professional profile, specialty, or educational background.

The intention behind this condition was not to focus on cases similar to the ones often studied as communities of practice —for a classic case, see Orr (1996)— and to consider communities that would have a more social than organizational ties.

2) They have low entry barriers for new members. They are communities that are open to the general public (even if in some cases there is a monthly fee to be paid). Any person with a related interest can join the community and participate to the community's activities. The community members keep however the right of not accepting a new member if they consider that the newcomers interests and intentions do not correspond with the communities goals or if the newcomer is judged as being a "free-rider" not willing to collaborate and share correspondingly.

This condition ensures that the community facilitates the interaction with their local environment and is porous to the local buzz.

3) They explicitly encourage the free sharing of knowledge, information, and tools among their members on a non-proprietary type of collaboration.

This characteristic contributes to the knowledge flow, both among the insiders and the outsiders. In many cases the community offers public free access to their (codified) knowledge (generally through their webpages).

4) They belong to a certain "movement" or trend that is observable at an international level. In this way, the chances of generating global pipelines increase by the cognitive proximity

of distant communities of the same global movement.

Following these four conditions, three communities located in Barcelona have been selected purposely considering their openness to knowledge transfer both locally and globally. The selection had a double goal; on the one hand to allow replication by considering cases that corresponded to the above criteria and, on the other hand, to allow transferability by ensuring that the cases were different enough to illustrate different collaborative emergent global movements.

2.5.2.2. Method

Field research with communities outside organizational settings provides particularly rich data on my research question for three key reasons. First, my research question is exploratory in nature. There is little theory or research on highly creative and innovative communities outside firms belonging to global movements that have recently emerged, like the coworking, the fabber, or the maker/hacker movements. Facing this lack of previous research, a qualitative methodology provides the optimal conditions to access richer and more dynamic sources of data than a quantitative approach (Marshall and Rossman 1989). Second, given my focus on knowledge dynamics outside organizational contexts, the study of communities embedded in their local environment and having strong global ties had an important theoretical significance. Knowledge dynamics in clusters have generally been studied at the inter-organizational level, largely ignoring the role that external local actors, like communities, play in the local dynamics. Similarly, previous research on global knowledge dynamics between cities has focused on economic actors like firms' employees or multinational enterprises, without considering actors outside organizations. Third, field research provides the opportunity to examine in depth the specific processes, practices and dynamics that allow knowledge sharing. Researchers have generally tended to describe the actors and the conditions involved in the knowledge dynamics overlooking how knowledge is actually shared.

2.5.2.3. Data collection

The study is mainly based on two sources of data: semi-structured interviews, and direct observation. Secondary data like the content of the spaces' web pages, online forums and discussion mailing lists has also been taken in consideration.

Semi-structured interviews. The main sources of data were semi-structured interviews to two different groups. The first group consisted in 15 interviews with managers and members of the spaces (5 interviews per case), totaling 16.5 hours. Six interviews were with managers of the spaces and 9 members. Interview questions focused on the activities of the community, their ties to other local communities and individuals and their interactions with communities in other cities. The questions also dealt with the kind of interaction with those external agents, to specify the nature of the relationship and the kind of exchange. As part of a triangulation strategy, a second group of 18 interviews were conducted: five to managers of other maker spaces and coworking spaces in Barcelona, four to managers of similar spaces from other European cities (Berlin, Brussels, Florence, and Madrid), and nine to specialists from Barcelona that have followed the evolution of the collaborative and innovative movements in the city. These individuals were researchers, practitioners and policy makers that represented what Eisenhardt and Graebner (2007, p.28) call "highly knowledgeable informants who can view the focal phenomena from diverse perspectives".

Direct observation. The second main source of data was non-participatory observation of the community activities (Lee, 1999). In total, I conducted about 20 hours of formal observation and several more of informal observation. Following observations, I took notes that helped me to build a more comprehensive understanding of the environment,, the knowledge dynamics and interactions between the members of the communities.

2.5.3. Case studies

2.5.3.1. A community of fabbers

The Fab Lab concept originated in MIT's interdisciplinary Center for Bits and Atoms (CBA) where a first lab was put in place empowering students to make (almost) anything (Gershenfeld 2005) by the use of new technological tools for rapid prototyping like 3D printers, laser cutters, and programmable sewing machines that allow small-scale production. There is currently a network of Fab Labs composed by more than 220 labs distributed around the globe, cities and rural areas, both in developed and developing countries. All Fab Labs follow MIT's charter (CBA-MIT 2012). They serve a wide spectrum of users, from youth, inventors as well as companies and students. They also serve multiple uses like teaching, professional development, applied research and research services.

Fab Lab Barcelona (www.fablabbcn.org) was the first Fab Lab launched in Spain, following the MIT's guidelines. Despite being housed in the facilities of an educational institution — the IAAC (Institute for Advanced Architecture of Catalonia) — it is open to external individuals and communities. The majority of the community members of the Fab Lab are related to the hosting institution (mainly students and collaborators) but the projects developed in the Fab Lab go beyond architecture-related themes. The members of the community meet and work in the same space on a regular basis, both on personal projects and collective ones. The core team is composed of about a dozen persons, mainly students of master programs at the IAAC. There is a certain membership rotation, following the academic cycles of the institution, but members tend to be involved in the community long after their have graduated or even moved to another city. A high percentage of the community members are foreign students. Cultural distance is acknowledged by the members by being at the same time a source of diversity and representing a difficulty in the communication.

Fab Lab Barcelona is located in the 22@, Barcelona's urban innovation district. The 22@ is in the Poblenou neighborhood, a former industrial zone, where old factories have been

reconverted into offices of knowledge-intensive firms. In the district, long-time neighbors mix together with newcomers fruit of the gentrification of the 90's-00's. In this heterogeneous social context, the Fab Lab has not attracted much attention from the local neighbors. However, it has developed strong links with other similar spaces, located in Barcelona and in other cities around the world.

At the local level, the Fab Lab has engaged in collaborations with other spaces of collaborative innovation like Hangar (http://hangar.org/), a publicly-funded space for technological artists, and member of the Barcelona Art Factories program network. Collaboration is done through projects that combine the expertise of the members of different spaces. For instance, a Fab Lab Barcelona member initiated a project to develop an electronic board with different sensors that would compile data about the environment, such as humidity and temperature and that would share the information through internet via a Wi-Fi connection. Fab Lab Barcelona and Hangar have collaborated combining their assets and capabilities. The Fab Lab provides all the prototyping machinery and tools while Hangar contributes with the work of two electronic engineers that have programmed the board. The result is a product that is simpler and cheaper than the ones existing in the market. The project is currently in a pre-production phase.

In the last years, other Fab Labs have been launched in other districts of the city. The Fab Lab local network has been expanded following a pioneer program lead by the city hall called "Fab City" and that aims to launch one Fab Lab in each district of Barcelona. Apart from the Fab Lab Barcelona in Poblenou, other two Fab Labs have been inaugurated so far and seven more are planned to be launched in the next years. The Fab Lab Barcelona members, notably its director, have been directly involved in assessing and counseling the city hall about the conception and implementation of the other new local Fab Labs. That is one of the few, if not the first, public institutional initiatives in the world to try to bring the 'fabbing' movement to the level of a whole city by empowering the citizens to collaborate in their districts' local innovation processes.

At a global scale, the Fab Lab Barcelona belongs to the Fab Lab worldwide network where

it has a prominent role. Fab Lab Barcelona has been one of the main contributors in the creation and the coordination of the Fab Lab Academy. This academy aims to diffuse the knowledge about how to use the tools of a Fab Lab, through weekly virtual global lectures and through on-hands practice in the lab facilities. All the sessions are recorded and are shared online for free. Following the Fab Lab Charter, Fab Lab Barcelona documents all the projects — instructions, data, and tips — on their website where they are publicly available. Members of the Fab Lab Barcelona have also travelled to help with the launch of other Fab Labs around the world, notably in South America. Fab Lab members around the world meet once a year in a conference where knowledge and information about "fabbing" is shared in face-to-face interactions.

2.5.3.2. A community of coworkers

The coworking movement started in the early 2000's (Spinuzzi 2012). Co-working spaces are more than mere shared offices. They have a focus on knowledge sharing and collaboration among their members. Even if the spaces are very different in both services and culture, they shared four common values: "collaboration, openness, community and sustainability" (Leforestier 2009). Coworking enables collaboration, shared knowledge and mutual learning and offers opportunities to reach commercial deals among coworkers. These spaces allow encounters between people working in different professions that can result in new innovations (Heikkilä 2012). Coworking spaces take generally the legal form of a startup that charges a monthly fee for allowing its members to have access to common equipment and facilities. Coworkers, apart from the advantage of sharing fixed costs, identify as the main advantages of joining a coworking space the interaction with other people, random discoveries and opportunities, knowledge sharing and being member of a strong community (Deskmag 2012).

Barcelona is the European city with a higher density of coworking spaces, with more than one hundred (CoworkingSpain n.d.). The first co-working space launched in Spain, Gracia Work Center (GWC), opened in 2007 in the district of Gràcia in Barcelona.

GWC is a relatively small office (120 square meters) where about fifteen entrepreneurs and freelancers work together on a daily base. Each coworker pays a monthly fee to GWC, whose founders work in the same office and in the same conditions as the other coworkers. For GWC founders, running a coworking space is more about reducing costs and creating networking than maximizing profits. The founders have their own startups that they develop in combination with the management of the GWC space. Some of the coworkers have been working at GWC since its inauguration, seven years ago. Other co-workers have left the space, but the majority has kept in contact with the managers and the other co-workers and they are still considered as members of the GWC community. In some cases, these professional and personal ties have been at the origin of a new job opportunity. Coworkers shared the principles of the "coworking movement" (Coworking.com n.d.) that promulgates the spirit of community and knowledge-sharing. The daily interaction among the members of GWC has created a sense of common identity and sense of belonging to a community. Even if each coworker focuses on his own professional project, it is usual to share experiences and "lessons learned" in informal conversations, during the lunch breaks or near the coffee machine.

At the local level, GWC and the other coworking spaces in the Gràcia district play an important role in the local entrepreneurial life. The majority of the coworkers live near their coworking space. To live near the office is an important aspect when deciding which coworking space to choose. Coworkers not only share a space to work during the weekdays, but also live in proximity and interactions outside the office are common. In the same district, more than twenty other spaces have opened in the last years. Being private for-profit companies, the increasing number of coworking spaces in the surroundings could have been considered as a menace for GWC. However, GWC managers not only do not see a risk in the expansion of the local coworking movement but, on the contrary, consider it positive to the point that all the district coworking spaces collaborate together. They have created a local network of entrepreneurs, small startups and freelancers called "Silicon Gracia". The network's goal is to coordinate efforts and to collaborate to gain external visibility to attract potential foreign customers and thus to improve their job opportunities.

At the global level, Barcelona is one of the main European hubs for co-working and the coworking communities located in the city play a major role in the European coworking movement. The 2013 Coworking Europe conference took place in Barcelona and the Gràcia's network of coworking spaces is participating in its organization. The event contributes to reinforce the ties among local coworkers as well as creating distant ties with coworkers from all over Europe. GWC is in constant contact with other European coworking spaces and hosts often foreign coworkers that are temporary in Barcelona.

2.5.3.3. A community of makers

"Maker space" is a term that designates a workshop that offers access to machines and tools for experimenting with technology and production processes. Maker spaces are characterized by a culture of openness that relies on sharing knowledge, skills and tools (Seravalli 2012). These "shared machines shops" (Hess 1979) are open self-organized environments with a strong emphasis on invention and technology based on exploration and free-sharing of knowledge. They are mostly nonprofit organizations.

Some maker spaces refer to themselves as "hacker spaces" or "hacklabs" (Maxigas 2012). The difference between maker spaces and hacker spaces is unclear, although it is generally accepted that makers focus on hardware and hackers on software. The preference to use the term "maker" might be due to a general misinterpretation of the word "hacker" that can be related to illegal practices (Moilanen 2012).

Maker/hacker spaces could be straightforwardly defined as being communities' workspaces which operate on the principles of hacker ethics (Himanen 2002; Levy 2001; Farr 2009). They are driven by an open culture that, through a sharing attitude and a peer-to-peer approach, can enhance the development of distributed networks and social bonds (Bauwens 2006). Emerging from the counter-culture (Grenzfurthner & Schneider 2009), maker/hacker spaces are a large set of differing places, with one ubiquitous feature: a community of enthusiasts sharing a common motivation (Schlesinger et al. 2010). Altruism, community commitment, meeting other makers/hackers in the "real" world and having fun seem to be

the most important factors of motivation (Moilanen 2012). Following hacker ethic, they also focus on their local community development and the improvement of society in general.

"Makers of Barcelona" is a hybrid space in the district of Eixample Dreta in Barcelona. Its surface is distributed in two distinct open spaces of 500 square meters each, one dedicated to a maker space and the other to a coworking space. Each space attracts people with distinct interest but the constant interaction between the "maker" community and the "coworker" community provides the crosspollination of ideas and knowledge. The maker community is composed of hobbyists that share their personal tools (laser cutters, 3D Printers) and meet regularly few times a week after working hours. The local maker community is very open to the knowledge transfer in their local environment to foster the neighbors' participation. For instance, at the entrance of the space there is a "fab café", a coffee shop opened to the public, where citizens can get in contact (usually for the first time) with laser cutters and 3D printers. Other activities led by the maker community have been to organize a "mini-maker faire", an event where makers show their projects and share their knowledge to visitors. This kind of events is part of a larger movement (Makerfaire.com n.d.) and it contributes to involve the local community into the global maker movement.

2.6. Discussion

From the three studied cases, some conclusions can be extracted.

First, the studied communities show that the classification into the different types of knowing communities is not evident. Whereas the Fab Lab community could be defined as a community of practice, having the majority of its members a similar educational background, it is hard to affirm that they had a common goal or focused on improving their practice. Their focus on intense exploration and knowledge creation could be rather assimilated to an epistemic community. The coworker community is nearer to what has been defined as a collectivity of practice (Lindkvist 2005) with the exception that each coworker was dedicated mainly to his/her own professional project and were not a project team. The community of makers can be defined as a community of practice, characterized by a "learning by making" approach, although they are often more focused on sharing their knowledge with outsiders than insiders of the community. In addition, all studied knowing communities share characteristics with the concepts of virtual communities or networks of practice as they all have frequent interactions and knowledge exchanges with distant similar communities. Finally, all the global movements associated with these communities (fabbing, coworking and maker) can be viewed as constellations of practice.

Second, knowing communities are not hermetic structures. The view of communities as a tightly knit group of individuals who engage in frequent interactions in physical proximity sharing a common situated context or practice (Lave & Wenger 1991; Wenger 1998) offers only a partial view in order to understand the knowledge dynamics within the communities and between the communities and their environment. To consider the knowledge exchanges of communities at a local and global level contributes to show how the communities' knowledge is externally diffused and, at the same time, external knowledge is integrated into the community. The integration of diverse knowledge frames is especially important to avoid one of the major risks that a knowing community faces, that is, a lock-in effect due to a too much closeness and proximity (Roberts 2006; Boschma 2005).

Third, the studied communities contribute actively to the "local buzz". By their openness and knowledge sharing practices, communities not only contribute to the local buzz through spillovers and knowledge externalities but also by seeking in an explicit and voluntary way the free diffusion of their knowledge. The local buzz has usually been described as a phenomenon in which local economic actors (mainly within firms in clusters) take part in an involuntary manner just by passively "being there". This research indicates that the local buzz can also be fed 1) by actors outside firms and, 2) in a pro-active, purposeful and voluntary manner.

Fourth, knowing communities contribute to the creation and knowledge transfer through "global pipelines". The fact of being part of networks of cognitively similar spaces and being associated to global movements has accentuated the external knowledge sharing. In these networks, there are generally systems that help to effectively share knowledge among members, reinforcing the global diffusion of locally created knowledge. Some of these pipelines are based on the use of information and communication technologies. For instance, the network of Fab Labs shares knowledge through their web pages, the Fab Lab Academy courses and the online repository. This represents the (partial) codification of tacit knowledge that has been detached from its contextualized and localized origin to be globally accessible. Community members from around the world having similar cognitive backgrounds are able to understand and re-contextualize the shared codified knowledge. All Fab Labs have the same hardware inventory that allows replicating the same practices even in distant Fab Labs.

Fifth, agreeing with the buzz-and-pipeline model, the findings indicate that the knowledge dynamics of the "local buzz" and the "global pipelines" are complementary and reciprocally feed themselves. New knowledge created within a community, can be shared with their local environment by geographic proximity and with a distant environment by cognitive proximity with a member of a similar community.

2.7. Model of local and global knowledge dynamics within communities

The findings allow us to propose a model that summarizes how knowing communities contribute on the one hand to dynamize the local knowledge flows and, on the other hand, to share knowledge with distant actors.
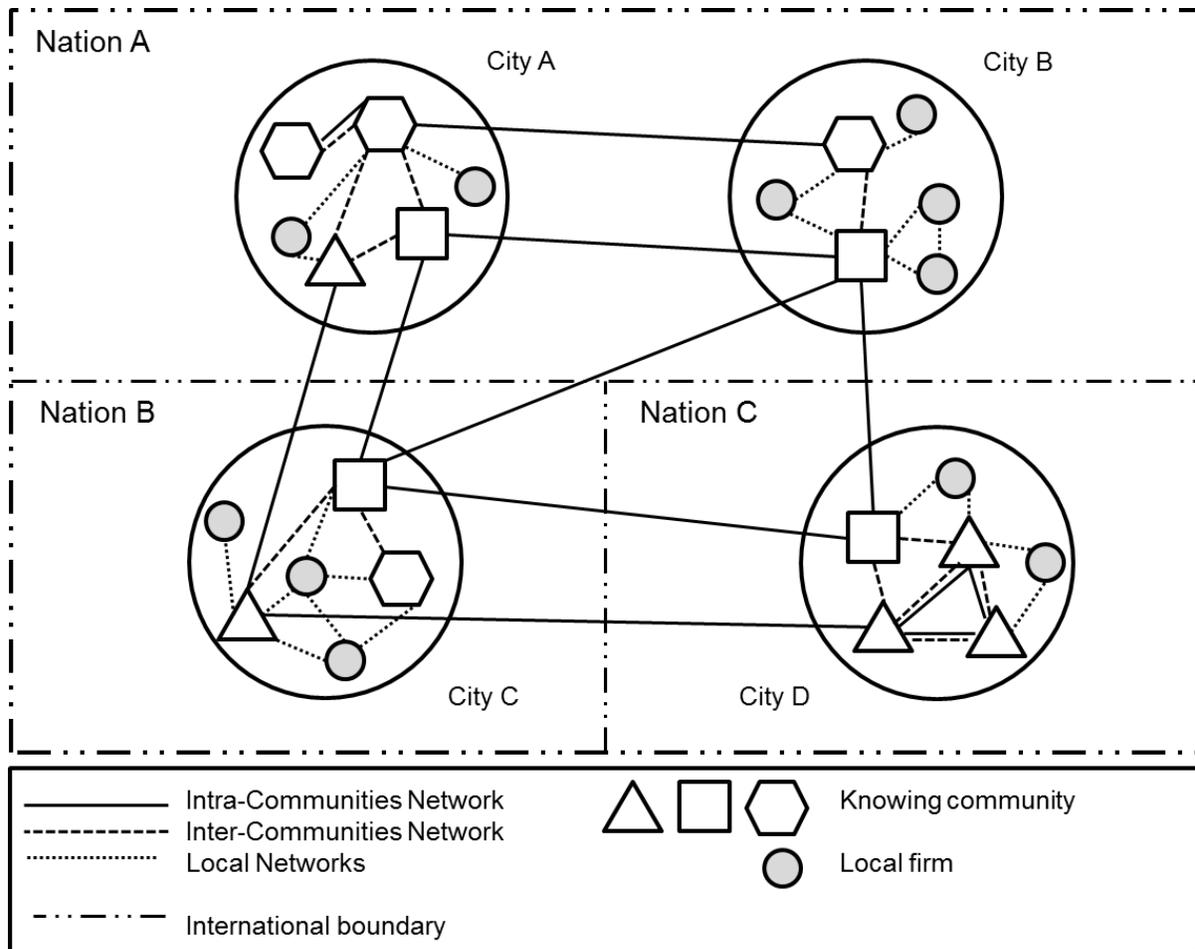
Figure 9. Local and global knowledge dynamics within knowing communities.

Figure 9 represents how knowledge flows at a local and global level. The different dynamics can be summarized as follows:

- Local knowledge dynamics:

- Distinct communities with similar knowledge bases may be co-located in the same city. Their geographical and cognitive proximity facilitates the knowledge transfer between them. For instance, as mentioned in the case study, coworking spaces might collaborate and exchange knowledge in a same district. The collaboration of Fab Labs located in different districts of Barcelona is another example of the close relationship between similar communities.

- Communities that share common values oriented to the knowledge sharing and openness might also collaborate within geographical proximity. For instance, as it is the case in Barcelona, the Fab Lab has a strong relationship with other communities like local artists or makers. Similarly, the coworker and the maker communities share knowledge because they are co-located in the same space "Makers of Barcelona".

- Communities, inside or outside firms, interact with local firms and other organizations. According to Cohendet *et al.* (2010), localized communities represent intermediary actors (referred as the "middleground") between creative individuals (the "underground") and formal organizations (the "upperground"). Communities contribute to the creation of links between local actors that focus on the exploration and other local actors whose primary goal is the exploitation of innovative products and services. In this way, communities of the "middleground" nurture the "local buzz" by integrating the knowledge of actors outside firms into the organizational innovation processes.

- Global knowledge dynamics
  - Similar communities integrated in global networks might be geographically distant but share similar cognitive frames of reference, values and practices. Thus knowledge sharing among members of such communities has a low cost. Relationships and mutual understanding are facilitated by the networks' insiders by sharing common interests and

codes. The transmission of knowledge can take place by virtual interaction or in temporary colocation.

In this model, communities act as platforms for global knowledge transfer. The knowledge dynamics —local and global— are closely intertwined and, in combination, allow knowledge flows from a local environment to another distant local environment. In this way, communities represent knowledge-brokers between distant organizations which the only commonality is to have links with their respective local knowing community.

The proposed community-based model is not opposed to the buzz-and-pipeline model (Maskell *et al.,* 2006; Bathelt *et al.*, 2004). On the contrary, both models complement each other. While the model developed by Bathelt *et al.* mainly focus on the dynamics observed in clusters and on the knowledge shared among firms and other economic agents, the community-base model takes a wider focus, including communities and actors that are outside firms but that nevertheless participate in innovation processes. At the local level, the model integrates the relationships between firms, communities and citizens. At the global level, it considers interactions beyond professional inter-firm relationships.

2.8. Conclusion

The most common level of analysis to study the knowledge dynamics in economic geography has been related to economic (clusters, firms) or geographic (regions, cities) entities but little research has focused on non-market actors like communities. Knowledge is crucial for the innovative capacity and economic development of cities. Its study should take in consideration all the city actors that are involved in innovative processes and not be limited to knowledge dynamics among firms. As Howells and Roberts argue: "Serendipity and non-market situations are still highly important; social interaction and embeddedness, past historical actions, geographical proximity, trust and chance all play a significant role in knowledge processes" (Howells & Roberts 2000). The concept of tacit knowledge has especially been highlighted in order to understand the importance of geography in the current knowledge-intensive economy and it has contributed to put a stress on the role of communities in economic geography field. As Gertler affirms: "communities of practice are seen as the principal mechanism through which tacit knowledge relating to new practices is produced and spread" (Gertler 2001). In this way, knowing communities are also vehicles through which "best practices" may be spread throughout large (including multilocational) organizations (Gertler 2001). The argument can be taken further by claiming that the relational and organizational proximity developed in knowing communities are more important than the geographical proximity (Amin & Cohendet 2000). This article aims to reinforce this idea, by arguing that communities are social and cognitive platforms which link insiders independently of their location.

The arguments exposed in the paper contribute to answer the initial research question that consisted in understanding how do knowing communities outside firms contribute to the knowledge dynamics at a local and global level. At the local level, the different case studies show how the strong local embeddedness of the communities facilitates their interaction with their local environment (e.g. neighbors, organizations and governmental bodies). The cognitive proximity and shared practices between similar communities allow not only the knowledge dynamics between co-localized similar communities, but also with distant ones.

However, as the studied communities show, the interactions between similar communities are more frequent and important at the local level than at the global level, where the interactions are mainly between communities belonging to the same global movement. In other words, a Fab Lab community might share knowledge with a local maker space community, but at a global scale will mainly interact only with members of other Fab Labs.

The local and global knowledge dynamics through knowing communities has its limits though. The empirical study here presented has been based on extreme cases, in which sharing knowledge was one of the main focuses of the communities. However, in many other cases, communities might not have the primary goal of diffusing their knowledge or do not belong to a network of similar communities to facilitate the global knowledge flows. The model might be less applicable in the case of local knowing community lacking external links or not wishing to share their knowledge with outsiders. Also, the communities studied in this research are characterized by being outside firms and not depending on formal organizational hierarchical structures. In the case of a community whose members are employees of a firm, the organization might avoid knowledge leakages in order to maintain its competitive advantage in front of competitors. However, as noted in the literature (Wenger 1998), communities of practice are autonomous and self-managed structures that often cannot be managed or controlled in a hierarchical manner. Thus the participation of a community in practices of global knowledge exchange seems more related to the willingness and openness of their members than on the organizational structure where the community is embedded.

In relation to the described limitations of this study, further research could focus on the local and global knowledge dynamics of knowing communities within organizational contexts, to analyze the local impact of knowledge shared locally between members of similar communities, both co-localized and distant. In this sense, the context of multinational enterprises, where distant similar communities of specialists exchange knowledge on a regular basis, would be an appropriate research field to identify the influence on the different local knowledge bases and local innovation contexts.

As concluding note, the policy implications of the arguments that have been exposed so far need to be analyzed. Policy efforts aiming to contribute to the innovation capacity of cities have generally focused on fostering local intra or inter-cluster dynamics. Few efforts have been dedicated to the integration of citizens and associations outside firms in innovation processes in order to enrich the shared local knowledge and to democratize innovation. Urban policy makers have also often overlooked the importance of the creation of knowledge flows with external actors, and have rather preferred to focus on attracting external talent following questionable social engineering practices. By detecting and nurturing emergent local knowing communities and by helping them to create links with local and translocal actors, policy makers might contribute to favor the organic development of the perdurable innovative capacity of their city.

Endnote

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Chapter 3: Coworking spaces and the localized dynamics of innovation. The case of Barcelona.

Abstract

The innovative capacity of cities does not exclusively depend on the innovation processes managed by local firms. This paper considers a multi-level perspective to analyze the crucial role of individuals and communities outside firms in the dynamics of innovation in cities. Through a qualitative study of the communities emerging in coworking spaces in Barcelona, we disentangle the different dynamics of innovation involving community insiders and local actors (firms, citizens and governmental bodies). We argue that coworking spaces act as intermediaries between creative individuals (the "underground") and innovative firms (the "upperground"), contributing to the interaction between colocated actors through the articulation of places, spaces, projects and events. The results lead to suggestions for policies to contribute to the emergence and development of innovation in cities by fostering innovative processes outside firms.

3.1. Introduction

Research on the dynamics of innovation that take place in urban spaces has generally focused on the study of the interactive learning processes of colocated economic actors (Malmberg & Maskell, 2006; Maskell & Malmberg, 1999a). This literature has acknowledged that both traded and untraded interdependencies between formal organizations contribute to a systemic effect in the processes of innovation, where different and diversified types of economic actors interact and collaborate to engage in innovative endeavors. Despite acknowledging the importance of the face-to-face informal and social interaction at the individual level (Asheim, Coenen, & Vang, 2007; Bathelt, Malmberg, & Maskell, 2004; Storper & Venables, 2004), current research has studied the localized innovation dynamics focusing the level of formal organizations and institutions. Research has often neglected the multi-scalar character of innovation (Bunnell & Coe, 2001) by ignoring the micro-scale of analysis in the innovation processes in cities. This micro-scale is composed by economic entities like individuals (entrepreneurs, freelancers and other types of self-employed professionals), micro-firms, or communities. A recent research trend in economic geography has partially palliated this lack by underlining the importance of knowledge communities in innovation in territories (Amin & Cohendet, 2004; Coe & Bunnell, 2003; Cohendet, Grandadam, & Simon, 2010; Gertler, 2003; Henry & Pinch, 2000; Saxenian, 1994). These works have notably contributed to the literature on innovation communities by contextualizing them geographically. However, the question about how individuals and innovation communities participate in localized dynamics of innovation is still unclear. The contribution of this paper is to answer to provide an answer to this question.

This paper is concerned with the dynamics of innovation of emerging communities in collaborative spaces in urban environments and in studying how these innovation processes are embedded in the local innovation dynamics in the city.

To do so, we analyze how innovation practices develop in coworking spaces (CWS from now on) in the city of Barcelona. The level of analysis is purposefully multi-scalar in order to take into consideration individuals, communities and firms. Considering the role of CWS

as an intermediary ("middleground") between creative individuals ("underground") and innovative firms ("upperground") (Cohendet et al., 2010), this study contributes to the understanding of the anatomy of innovative cities by disentangling the different ways the localized innovation processes develop in urban environments. We analyze the dynamics of innovation according to the concepts of place, space, projects and events (Grandadam, Cohendet, & Simon, 2012).

The structure of the article is as follows. First, the concept of coworking is introduced. Coworking is an increasing trend in the configuration of organization of independent professionals and small startups in urban environments. Second, we briefly review the literature on the dynamics of innovation in cities, considering the diverse of scales of innovation processes. Third, an empirical qualitative research analyzes the innovation processes in CWS in Barcelona, describing the dynamics among the members of the CWS on the one hand and, on the other hand, between the CWS community and the local urban environment consisting on firms, public institutions and neighbors. Finally, before concluding, we discuss the similarities of the dynamics of innovation in clusters and CWS and the implications of our study for policy makers.

3.1.1. The coworking phenomenon

The term coworking has started to be used as a buzzword and its meaning is far from clearly defined. Not all shared offices that use the term to define themselves can be considered as such. Defining CWS as "open-plan office environments in which they work alongside other unaffiliated professionals for a fee" (Spinuzzi, 2012, p. 399) does not consider one of the most important features of CWS, and that differentiate them from mere shared offices: the focus on the community and its knowledge sharing dynamics. Coworking.com defines coworking as: "a global community of people dedicated to the values of Collaboration, Openness, Community, Accessibility, and Sustainability in their workplaces" (Coworking.com, n.d.) and clarifies it:

"The idea is simple: independent professionals and those with workplace flexibility work

better together than they do alone. Coworking spaces are about community-building and sustainability. Participants agree to uphold the values set forth by the movement's founders, as well as interact and share with one another. We are about creating better places to work and as a result, a better way to work." (Coworking.com, n.d.).

Concerning this article, CWS are defined as localized spaces where independent professionals work sharing resources and are open to share their knowledge with the rest of the community.

The first "official" coworking space was founded by Brad Neuberg in 2005 when he organized Spiral Muse in San Francisco as a reaction of the lack of social implication of business centers and the unproductivity of working at home (Botsman & Rogers, 2011; Deskmag.com, 2013; Hunt, 2009). Since then, the coworking phenomenon has spread all over the world, converting the term a buzzword, with multiple definitions and uses. Currently, there are more than 100,000 people around the world that are members of one of the 3,000 coworking spaces running around the world (Deskmag.com, 2013). In Barcelona, for instance, more than one hundred spaces define themselves using the term coworking. In Europe as in the United States, there are annual conferences dedicated to Coworking where CWS managers meet, share experiences and discuss about common issues. There are several networks of coworking spaces that operate CWS in several locations, such as The Hub, NextSpace or Urban Station. Nevertheless, the majority of coworking spaces are small local private startups that run independently with only one or two locations. Some of them are organized in associations to offer more services and create more values for their members.

Being an emergent phenomenon, there are still few publications (Davies & Tollervey, 2013; DeGuzman & Tang, 2011; Jones, Sundsted, & Bacigalupo, 2009; Jones, 2013; Kwiatkowski & Buczynski, 2011a, 2011b; Nakaya, Fujiki, & Satani, 2012) and few academic research (Spinuzzi, 2012) dedicated to coworking.

3.2. Multi-scalar dynamics of innovation in cities

3.2.1. Innovation and firm size

Much research studying the locus of innovation in clusters has been concerned on the size of the organizations involved in innovation. With the end of the Fordist era, a renewed interest was put on the potential of small firms to innovate (Best, 2001; Piore & Sabel, 1984). Research on the dynamics of small companies showed that they allow a high degree of innovation to regions like the Third Italy (Amin, 1989; Trau, 1997), or Silicon Valley (Saxenian, 1994). Small firms have been acknowledged of being more innovative than large ones because they provided more flexibility and variability, thus improving their ability to build alliances and collaborate through projects (Acs & Audretsch, 1990; Birch, 1987). Networks of small firms might concentrate in clusters creating networks (Perry, 1999) that interact with larger firms as just-in-time production systems. The role of small and young firms has been acknowledged as being a crucial actors in generating economic dynamization of cluster and fostering the emergence of new businesses (Glaeser, Kerr, & Ponzetto, 2010; Henderson, 2003; Rosenthal & Strange, 2004). However, the literature has also identified strong clusters with the presence of larger firms that act as "anchor" firms that promote the emergence of spin-offs and attract new businesses to the cluster (Agrawal & Cockburn, 2003; Enright, 2000; Klepper, 2007; Scott, 1992). Regions with strong clusters provide the needed diversity and reduced costs to start new businesses, and are associated to stronger rates of new firms and start-up employment (Delgado, Porter, & Stern, 2010). Clusters where large and SME have succeeded to establish decentralized innovative networks (Langlois & Robertson, 1995) may be able to develop competitive advantages in front of radical structural changes in the industry. In this line, the creation of "learning networks" -transversal structures where individuals of different organizations participate- facilitate learning and thus increase the overall localized innovation capability and pace (Bessant, Alexander, Tsekouras, Rush, & Lamming, 2012; Bessant & Tsekouras, 2001).

So far, we have discussed the role of firms' size in innovation processes. However, research considering the multi-scalar character of innovation has also considered the role of actors outside firms. In the next section, we discuss the role played by individuals and communities in the localized innovation processes.

3.2.2. Middleground

Research on innovation in territories has traditionally focused on the externalities created among colocalized formal organizations (Breschi & Lissoni, 2001; Feldman, 1999) that are at the base of the development of ecosystems of innovation (Saxenian, 1994). However, innovation processes do not exclusively rely on the externalities between firms. The literature on innovation has shown the crucial role that users play in the development of new products (von Hippel, 2007) and consequently, firms have actively tried to capture the innovative value of external sources of knowledge and ideas (Chesbrough, 2003). Innovation communities create innovative solutions that are "sticky" (Lüthje, Herstatt, & Hippel, 2005; von Hippel, 1994). This local character of innovation outside firms is especially significant in cities and territories where there is a dense social interaction between actors (within or outside organizations) involved in innovative processes. This is especially relevant in the case of industries based on symbolic knowledge (Asheim & Gertler, 2006; Gertler, 2003), where commercialized products and services have a strong cultural component and are intimately embedded in the local culture.

The literature on creativity in cities (Florida, 2008; Hall, 2000; Landry, 2000; Pratt, 2008) acknowledges the importance of a lively social and cultural open environment in the innovation in cities, by attracting talented professionals and innovative knowledge-based firms. This view describes the kind of individuals and firms involved in the innovative process in cities but do not explain how these processes take place. Further research has argued that the interactions between creative individuals and formal organizations are often done through communities (Coe & Bunnell, 2003; Håkanson, 2005; Henry & Pinch, 2000; Lissoni, 2001). The actors involved in creative and innovative processes in cities are structured following three levels (Cohendet et al., 2010; Grandadam et al., 2012). First,

creative individuals and small informal communities focusing on exploration compose the "underground" (Arvidsson, 2007). The underground is mainly driven by intrinsic motivation and do not follow the market logics. Second, innovative cities host formal organizations and institutions that focus on the exploitation of creative endeavors. This level, defined as the "upperground" follow managerial and market logics, commercializing the outputs of the innovative processes. The third level, referred as the "middleground" plays the role of intermediary between the "underground" and the "upperground" (Cohendet et al., 2010). The middleground is composed by communities that, from the one hand, increase the visibility of creative individuals and their chances getting hired by firms of the upperground and, on the other hand, represent platforms where firms of the upperground can get in contact with new knowledge created at the local level by the explorative activities of the underground. The interactions in the middleground are articulated through places, spaces, events and projects (Grandadam et al., 2012).

3.2.3. Places, spaces, projects, events

Places are venues where individuals can meet and interact in a formal or informal environment. Cities with a high density of coffee shops, restaurants, concert halls, museums, and other public spaces facilitate the interaction between heterogeneous individuals, thus benefiting the emergence of local innovation processes (Rantisi & Leslie, 2010). The constant flow of knowledge and information in places contribute to nurture a "local buzz" (Bathelt et al., 2004; Storper & Venables, 2004).

In opposition to places, spaces represent cognitive constructions where individuals can interact and share knowledge (Amin & Cohendet, 2004) on the base of cognitive proximity and an absorptive capacity that allows them to efficiently identify, interpret and exploit the new knowledge (Cohen & Levinthal, 1990). Spaces are complementary to places. Spaces provide symbolic and cognitive meaning to physical places. Places reinforce the cognitive proximity of spaces with the geographic proximity, nurturing innovation (Boschma, 2005; Nooteboom, 2000).

Places and spaces represent platforms of local interaction on a permanent basis. However

temporary forms of places and spaces can be created by organizing projects and events. Events allow local and distant actors to participate, thus facilitating the creation and maintenance of "global pipelines" that contribute to the circulation of (tacit) knowledge (Bathelt et al., 2004; Maskell, Bathelt, & Malmberg, 2006).

Events represent platforms where the innovations that have been locally created can be exposed and discussed with a larger community, contributing to its improvement and diffusion. Similarly, events provide the opportunity to local actors to get in contact with ideas, knowledge and innovation from external sources and territories.

Projects represent organizational structures that are particularly convenient to coordinate and integrate heterogeneous knowledge bases as it is the case in most creative industries (DeFillippi & Arthur, 1998). The temporary aspect of projects allow the implication of actors that are normally (geographically or cognitively) distant (Grabher, 2002a).

3.3. Research design

3.3.1. Research context: coworking spaces in Barcelona

Barcelona is currently the European city with a higher density of CWS (BBVA, 2013). Among other reasons, the explosion of the coworking phenomenon in Barcelona is related to the Spanish economic crisis. The high quantity of empty offices and corporate buildings due to the crisis pushed some owners and real-estate agents to try to monetize their spaces by proposing low-rent shared offices.

The distribution of CWS in Barcelona is not homogeneous. Most CWS are located in central areas of the city, concentrated in three districts: Eixample dreta, Eixample esquerra and the Old district. Two other districts, away from the city center, also present a high concentration of CWS: Gràcia and Poblenou-22@. Gràcia is a creative area with its own differential character. Several of the coworking spaces of Gràcia have created the association Silicon Gràcia, mainly to increase their visibility and attract foreign coworkers. The district of Poblenou has radically changed in the last 20 years, and has been transformed from an old industrial district into the innovation district of Barcelona, the 22@. Figure 10 represents the geographic distribution of coworking spaces in different districts of Barcelona.
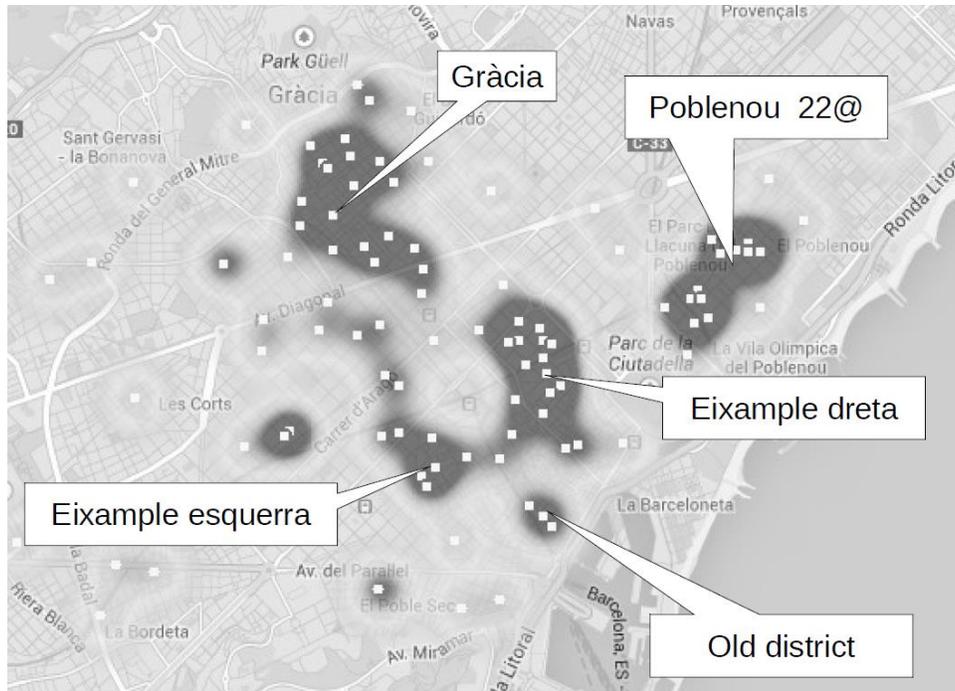
Figure 10. The geographic distribution of coworking spaces in different districts of Barcelona

The first CWS in Barcelona was launched in 2007 and currently, more than a hundred spaces in the city define themselves using the term "coworking". However, not all CWS spaces are similar. As a representative of a governmental body explained, three different types of CWS can be identified:

> *There are different coworking spaces. We distinguish three types. Firstly, there is a kind of coworking that is the coworking based on real estate. This is about an entrepreneur or a private person that has an empty office or building and that want to get an economic return. He has typicality heard about coworking and he thinks that by putting a sign on the door will attract enough people to fill his space and earn money. If there are not certain dynamics in the coworking space, there is not a community that emerges, or nothing changes, I don't think that such a coworking space will be able to survive for a long time. Secondly, there are these coworking spaces that believe in coworking and that create local community among their coworkers. This is a different model. We think that these ones have done well so far and that will do well also in the future. But we think that there is a third model of coworking, one that not only believes in coworking as a local*

community with physical proximity among members of the space but that also believes that coworking is a philosophy, a work methodology and consequently bets on the interaction among spaces. There are very few coworking spaces that believe in this third model. This is in this kind of coworking that we believe in. It is about the coworking that is about sharing, taken to its maximum exponent. In other words, the coworker is not only the guy working in this or that space, he is a user of a coworking space but he is convinced that sharing ad developing contacts he will have a more important professional and personal development than working from home or working in a space with a limited or reduced community. Selection takes place I a natural way. New spaces will be created but others that do not share this philosophy will either evolve to this model or be forced to close. (Interview to a representative of the Catalan Government)

Our research focuses on the innovative processes in CWS. Thus, we have centered our study on the third type of CWS described above, as we detail in the following section.

3.3.2. Methodology and data

3.3.2.1. Method

We opted to base our research on a qualitative methodology. This kind of methodological approach is especially convenient to understand phenomena that are new or that have not been previously studied (Eisenhardt, 1989). In our case, the coworking phenomenon has not been so far theorized or little research has focused on its study and specifically on the innovation dynamics. Facing this lack of previous research, a qualitative methodology provides the optimal conditions to access richer and more dynamic sources of data than a quantitative approach (Marshall & Rossman, 1989). A qualitative approach is also indicated to study the enactment of theoretical models in particular cases (Van Maanen, 1998). In our case, the study aimed to understand how CWS act as intermediaries in innovation processes, to offer an empirical study of the concept of the "middleground".

3.3.2.2. Sample

Through an internet search, personal contacts and a snowball strategy, we compiled a list of 118 CWS located in the city of Barcelona. All CWS were contacted by email and telephone, and finally the managers of 21 CWS accepted to participate in the research. Through a preliminary exploratory research three groups of CWS were differentiated, broadly corresponding to the three types of CWS above described. Table 5 summarizes our findings.

	CWS type 1 No innovative communities	CWS type 2 Innovative communities	CWS type 3 Highly-innovative communities
Studied coworking spaces codes	5 CWS (D, I, J, K, and M)	11 CWS (A, B, C, F, G, H, P, Q, R, S, and U)	5 CWS (E, L, N, T, and V)

Table 5. Types of studied CWS according to their innovation characteristics

In order to better observe the dynamics of innovation, in this research we focused on the most innovative communities (type 3) following the suggestions of Patton (2002), that underlined that extreme cases provide a richer evidence on the research topic.

3.3.2.3. Data collection

The study is mainly based on two sources of data: semi-structured interviews, and direct observation. Secondary data like the content of the spaces' web pages, online forums and discussion mailing lists has also been taken in consideration.

Semi-structured interviews. The main sources of data were semi-structured interviews. Respondents represented two different groups, 1) managers and members of CWS, and 2) specialists of the innovation in Barcelona.

The interviews in CWS were done in two phases. In a first step, an exploratory research

was conducted in the 21 different coworking spaces that agreed to participate in the study. In total, 28 interviews were done, most of them face-to-face in the CWS facilities. Interview questions focused on the individual activities, the collaboration with other members to innovate, the activities organized to foster innovation within the community and at a local level, and the type of interactions with external actors. This phase help us to identify the most innovative communities. The first phase also included interviews to nine to specialists from Barcelona that have followed the evolution of the collaborative spaces in the city in the last 20 years. These individuals were researchers, practitioners and policy makers that represented what (Eisenhardt & Graebner, 2007, p. 28) call "highly knowledgeable informants who can view the focal phenomena from diverse perspectives".

Direct observation. The second main source of data was non-participatory observation of the community activities, most of them in the CWS identified as being the most innovative. In total, we conducted about 30 hours of formal observation and several more of informal observation. Following observations, notes were taken to build a more comprehensive understanding of the environment, the dynamics of innovation and interactions between the actors within and outside the CWS community.

3.4. Results

The results of our research on the role of coworking spaces in the localized dynamics of innovation show three different types of dynamics:

1. Internal innovation dynamics among the space members
2. Innovation dynamics originated by the coworking space community
3. Innovation dynamics originated by local external agents

These three types of dynamics are differentiated according the concepts of places, spaces, events and projects (Grandadam et al., 2012). Our results are schematically summarized in Figure 11.
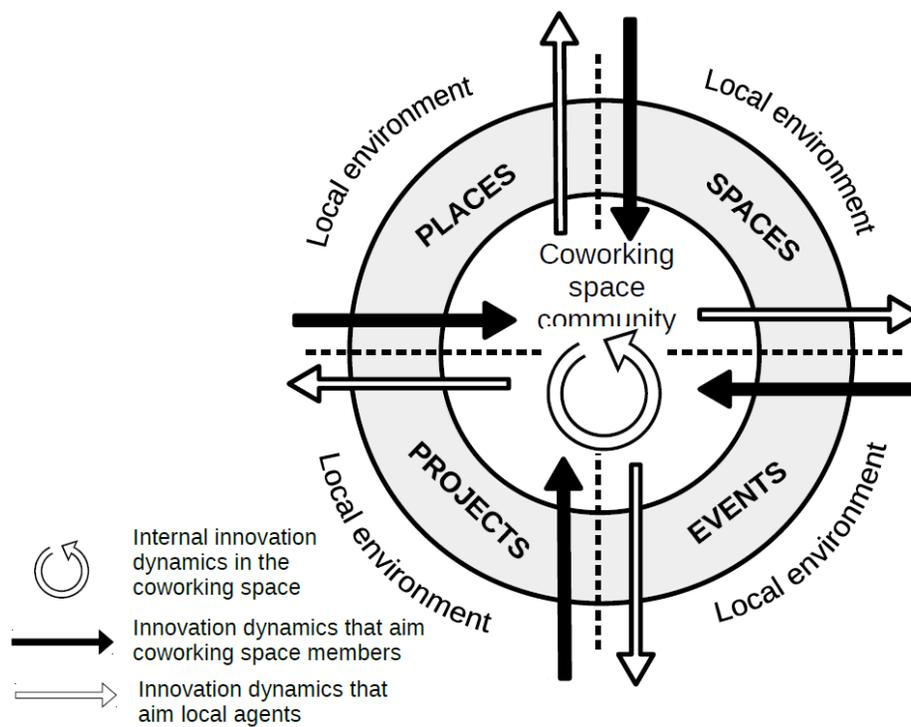
Figure 11. Localized dynamics of innovation in coworking spaces

3.4.1. Dynamics of innovation related to places

In the first place, coworking spaces are physical spaces in a specific location. The location (i.e. district), the physical space (i.e. distribution, size), and the material assets (i.e. tools, furniture) play an important role in the innovation dynamics. In general, the location and space characteristics are chosen by the founders of the space and *a priori* do not ensure that they will lead to innovation. Nevertheless, the "affordances" of such assets can allow informal interaction and benefit innovation (Fayard & Weeks, 2007, 2011). Physical places play also an important role in the face-to-face interaction between coworkers and external individuals, like neighbors, representatives of governmental bodies, and firms. For instance, on the ground-floor lobby of some coworking spaces there is a coffee shop / bar open to the public. These spaces are used by coworkers to relax and chat but also by neighbors and visitors, that interact with coworkers.

Figure 12 summarizes our findings about coworking spaces as being physical places contributing to innovation.
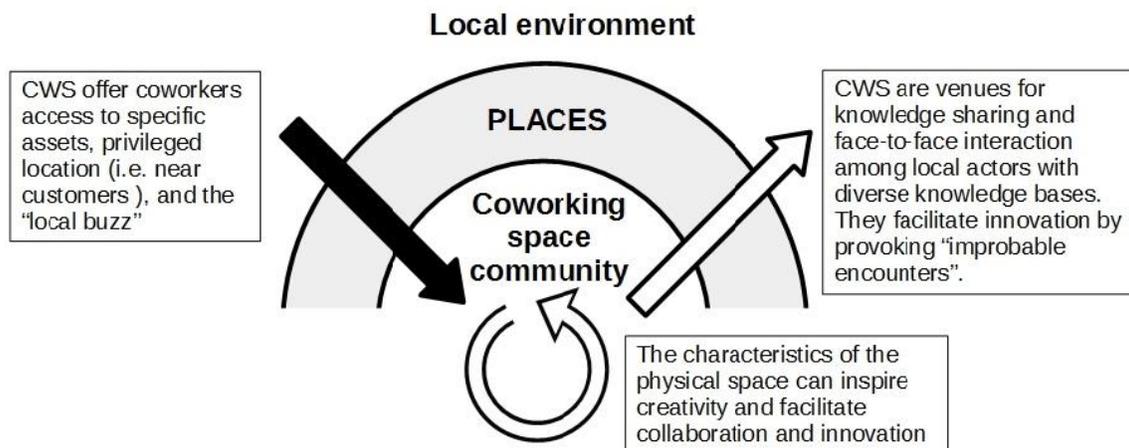
Figure 12. Dynamics of innovation related to places

3.4.1.1. Location

Proximity from home is often one of the main reasons for coworkers when choosing a coworking space. An interest for a specific location might lead different types of people to share a coworking space. The face-to-face frequent informal interaction between neighbors with different knowledge and professional backgrounds in a working space offer opportunities to collaboration and innovation. In this sense, coworking spaces act as "third spaces" (Oldenburg, 2002), spaces of socialization at the local level that contribute to the social cohesion.

Coworking spaces also offer the opportunity to professionals from outside the city to take advantage of having access to an office in a central location to be nearer their customers or suppliers. This allow from one side, local coworkers to have access to knowledge from external sources, and from the other side, external individuals to integrate the "local buzz" and get in contact with the locally developed knowledge. This cross-pollination facilitates new professional collaborations and innovative projects.

> *Just I live in this area. The rest of them [the other coworkers] are not from the neighborhood, not even from Barcelona, [...]. This is a space that they have in Barcelona. All their clients are in Barcelona. When they meet them, they have this space to do the meeting. It is a way of not losing contact with Barcelona. They mainly come by train. We are in the city center. (Interview with manager of space I)*

Barcelona is also an attractive destination for professionals and foreign companies. Nevertheless the professional integration of foreigners is often problematic (Leon, 2008). Coworking spaces offer a practical way to integrate a local professional community.

> *Barcelona is a city that likes to be capital of things, like football, mobile,... People like to come to Barcelona. We think that the attractiveness of other more mature [coworking spaces of our network] like the ones in Vienna, Berlin or Athens will help to create links and attract people to come here.(Interview with manager of space L)*

3.4.1.2. Physical space

The distribution, the size and other characteristics of the physical space influence the innovation dynamics within coworking spaces. For example, space N occupies a five-story building that members are free to change as they want. One of the managers explained the freedom given to members to experiment with the physical space:

> *There isn't any restriction about how to use the space. The only restriction is that another member might want to change what you did. [...] People take complete ownership of the space. There is no limitation. There is not a time limit or hours where the space is closed. If a meeting room is empty, you can use it if it is not booked [...]. We create the space ourselves. We made the tables and installed ourselves the internet connection. [...] This capacity of generating and regenerating gives us a capacity to develop ourselves. (Interview with manager of space N)*

According to a manager of a coworking space with a highly innovative community, large spaces are fundamental to run diverse activities simultaneously to facilitate innovative synergies to emerge. As he explains:

> *[Referring to the other coworking spaces of our network], Berlin has 3000 m^2, this one has 2000, Hamburg has 2000 and Sofia has 1500. Why did the one in Cologne failed? Because it was too small [...] The coworking area is for one thing, the workshop is for another thing... Everything has to be in the same place. [...] In Cologne, they thought: "Let's do it small, and while we grow, we make it bigger". But it didn't work. You have to do all this in parallel. (Interview with manager of space N)*

3.4.1.3. Material assets

Some coworking spaces are created in order that members can share specific assets, as tools and machinery. For instance, in space D, coworkers take advantage of the powerful datacenter that is locally installed, sharing the high costs of purchasing and maintaining a datacenter while avoiding the risks related to data hosting in foreign countries. In spaces E and N a zone has been reconditioned to build a makerspace with machines to develop

prototypes (like laser-cutters, 3D printers, etc.). The daily interaction with peers and sharing common practices and interests, contributes to the situated learning (Lave & Wenger, 1991), knowledge sharing and community building (Wenger, 1998).

3.4.2. Dynamics of innovation related to spaces

Sharing and using specific assets in colocation facilitates the emergence of specialized communities around specific interests and practices. The members of such communities not only share places (in geographic proximity) but also share spaces (in cognitive proximity). In Figure 13 are represented the different localized innovation dynamics involving coworking spaces communities in relation with the notion of space.
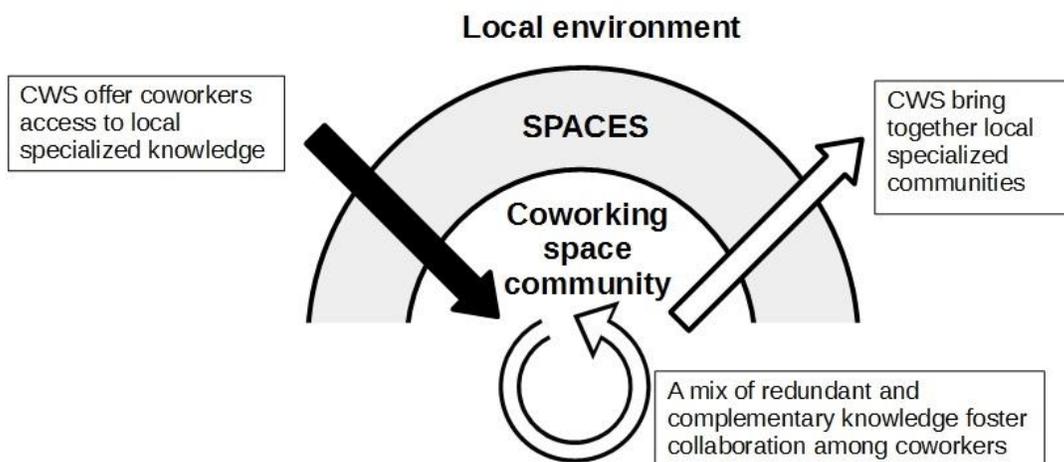
Figure 13. Dynamics of innovation related to spaces

Coworking spaces are mere shared offices while others become hubs for individuals with specific interests. It is also common that non-specialized coworking spaces gradually specialize, either by a natural evolution of the community or by the intentional action of the managers of the space. "Places and spaces are complementary, with the former leading to the latter" (Grandadam et al., 2012).

Reasons for specialization might have different origins. In some cases, the will to specialize is related to the associated values, as it is the case of the space B:

The group's leitmotiv is not to share space. The leitmotiv is on the one hand a collective project on cooperation and on the other hand, to position ourselves in the social economy to offer services. The motive that drives us to collaborate is the social economy and the other reason, more social-economic is to have a cooperative group that gives us more potential and visibility and that allows us to do projects together. We are currently 34 entities in this space. The common characteristic is another way of doing economy. (Interview with manager of space B)

Developing cognitive spaces reinforces the collaborative and explorative practices of the members of the community around specific themes, as a manager forecasts:

I think there will be a specialization of coworking spaces: some are more technological, others creatives... Spaces will no ling be open to all types of profiles but will specialize in architects, photographers, designers... I think that to create synergies, there will specialize. (Interview with manager of space F)

Specialization of coworking spaces is not generally considered in a narrow sense. For example, in space D the focus is on information technology. In the case of space E, there is a broad interest on creativity:

We are interested in three strategic lines: 1) creativity and design; 2) innovation and technology; 3) entrepreneurship [...] All our members, about 120, fit in one of these categories, and also all our activities and events. [...] We are a community of people that want to do things but do not have resources, knowledge, or tools. But they do not lack nor energy or passion. (Interview with manager of space E)

To be around peers allow coworkers to improve their specific capabilities while gaining new knowledge related to them. While sharing an important deal of common knowledge, coworkers also have complementary knowledge bases that can derive to fruitful innovation though collaborations and knowledge sharing activities. Space A is specialized in communication and marketing. Nevertheless, the members' profiles are complementary rather than redundant, as the manager explains:

We have a graphic designer, I do social media and communication strategy [...]

Albert does agency planning and branding and Eric does market research. [...] We try that the members of our community come from the world of communication, developers, graphic designers, illustrators, public relations, marketing, etc. At present we would need profiles for a project that we are doing together. Some people of our community do not work here in the space. (Interview with manager of space A)

Developing a specialized community in a physical place contributes to attract other individuals with similar interest at the local level. A manager explains how a specialized local community emerges around social entrepreneurship:

So far, we have functioned as a normal coworking and now we start to have people that are interested to where we focus on [...] Now we start to be able to select people that do things similar to ours. [...] People will not come because we have a beautiful space, rather because here are happening things that interest them. (Interview with manager of space L)

Specialized coworking spaces nurture the creation of specialized communities at two different levels. Firstly, the coworking activities facilitate the emergence of an internal community that has a frequent daily interaction in the coworking space. Secondly, the space also contributes to the development of a larger community of individuals that interact in a more sporadic way with the internal community. Coworking spaces become local hubs of specific topics, where cognitive proximate individuals share knowledge and interact thus reinforcing the local innovation.

Social innovation in Barcelona is extremely fragmented. [Our space] is a tactic argument to become a center of attraction. The coworking space is a way of bringing together. Events are another way of rallying the community. In our concept, coworking in an element, it is not the final reason. (Interview with manager of space L)

Events and projects allow bringing together actors with diverse backgrounds for a limited time. The temporary aspect of events and projects facilitate the participation of distant actors for a limited time, thus nurturing the creation of "global pipelines" of knowledge (Bathelt et al., 2004; Maskell et al., 2006). In the next sections, we present the role of events and projects in the coworking spaces in the local innovation dynamics.

3.4.3. Dynamics of innovation related to events

Figure 14 summarizes our findings about the role of events in the localized innovation dynamics.
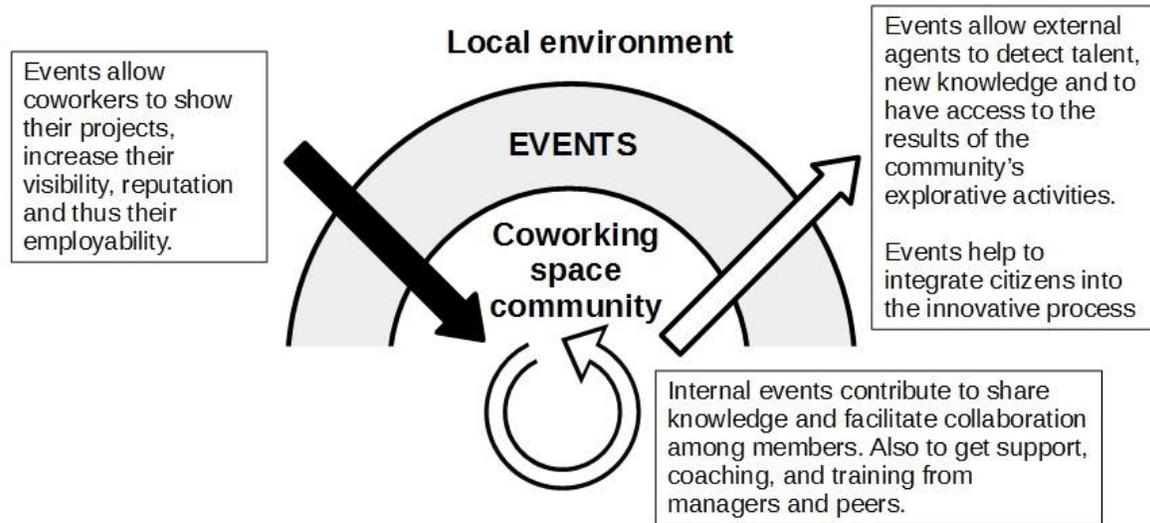
Figure 14. Dynamics of innovation related to events

As we show in this section events open to external agents have different roles in the innovation processes than internal events organized exclusively for the space members.

3.4.3.1. Events open to the public

As it has been illustrated in the previous section, events represent a way to develop a larger community interested in a specific theme, beyond the boundaries of the space. Events contribute to enlarge the internal professional community, by integrating people from outside. The manager of a space focusing in social innovation stated:

> *There are members of the space that normally do not work in [our coworking space] but that pay a minimal fee to have access to the weekly conferences or other*

events (Interview with manager of space L)

Events allow space members to present their projects to external agents and firms to detect talent and have access to new knowledge derived from the exploration taking place in the coworking space.

> *We have done a lot of things with Mozilla, we have done a couple hackatons, we are working with [a Spanish bank], etc. [...] They all are interested because we have this community. Do they take advantage? They get access to talent. For instance, we organized a startup bootcamp at the national level, something very viral. There were 250 presentations in one day, with 11 winners. They come to look for talent. We have hidden people that don't know what to do with their talent. Firms funded the event, each winner won 30,000 Euros. We don't have sponsors, and we don't want them. We want funding for events, but without binding ourselves to a firm or city hall. (Interview with manager of space E)*

The larger local community might also not be around a specific theme but be more generic, for instance to create bonds with the neighborhood and reinforce the district social cohesion. For instance, space C defines itself as a "center for resources for entrepreneurs and citizens". One of the managers affirms:

> *We do want neither a closed space nor a public space. But we wanted the citizens to participate. [...] we want to leave our footprint in the neighborhood. We organized an event with more than 2000 visitors. We want to improve the district's life. However, we don't have any public funding. (Interview with manager of space C)*

3.4.3.2. Internal events

Internal events in coworking spaces are generally organized by the staff in order that the members give advice and support to each other. In some spaces, managers coach individually the members to advance in their projects. Through these meetings, the coworkers get to know each other better and to share knowledge. As a manager explains:

> *It is clear that if you want to advance in your project, you need a community that*

helps you to grow and to give you support. We saw that some people got stuck in very basic questions. We decided to create a small group to deal with practical issues. [...] Even if you are working on your own project, you need a community. It can make a difference if someone helps you with a contact or his/her own experience. It is not necessarily a collaboration but at least support. (Interview with manager of space F)

3.4.4. Dynamics of innovation related to projects

While events represent opportunities of knowledge sharing, projects allow the coordination and integration of diverse knowledge bases. Through collaborative projects, agents engage in collaborative activities to reach an innovative endeavor. Members of coworking spaces develop projects within the space community as well as collaborating with external firms, individually or in collectively. Our results are schematized in Figure 15.
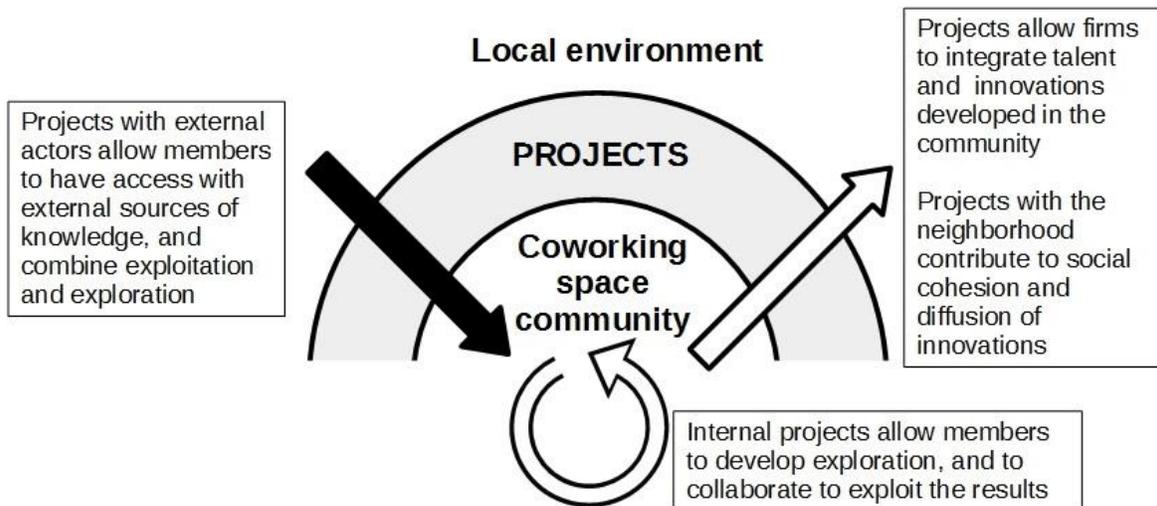
Figure 15. Dynamics of innovation related to projects

3.4.4.1. Projects developed internally

Coworking space members might collaborate to develop projects in order to focus either on exploration or in exploitation to develop a product or service to commercialize.

Due to the diversity of knowledge bases present in coworking spaces and the mutual knowledge of the capabilities of other members, members collaborate to develop projects. These projects combine their different expertise and allow members to increase the services that they offer to their customers. In some coworking spaces, coworkers have successfully found ways of offering joint services by collaborating on a project-base. For instance, a manager explained:

> *Our company is not really a company; we are a group of independent professionals working on the fields of sociology, political sciences and psychology. Each of us works independently doing our own research. Because we do not want to work alone at home, we have created this network that implies that when you have a small project, you do it alone if you want but when the project is big or is a long/term project, you propose to collaborate to the other members of the network. [...] We count hours, complete transparency. If I do the customer management, I keep a part of the budget, and the rest is distributed by the number of dedicated hours. [...] The number of hours is agreed beforehand when we do the budget. As all this is very difficult to do at a distance, we share this space. (Interview with manager of space I)*

In other cases, CWS members collaborate driven by intrinsic motivation to challenge themselves and engage in explorative practices. The following example illustrates the explorative character of the members of space N:

> *The app was done by the community in 36 hours. We wanted to do a hackathon in 36 hours [...] The idea was to do something where everybody could participate [...] They all are mega talented here and everybody was working together just like this, for the pure pleasure of doing it. It was done in 36 hours and uploaded on the Appstore. A guy calculated that to do that same app in a firm would have taken 5 or 6 months and cost about 100,000 Euros considering the senior expertise involved. (Interview with manager of space N)*

As this example shows, the innovative capacity of certain CWS communities outperforms the innovation in firms. This fact attracts firms to approach these communities in order to promote their products, search for talent to hire or to collaborate with the members to develop innovative projects.

3.4.4.2. Projects with external firms

The innovation dynamics involving both the CWS members and external firms are usually organized on projects. For example, space N has developed a highly innovative community. Their relationship with firms is also innovative. The CWS managers avoid sponsorship understood as getting free products or putting a visible logo at the entrance. Instead, they propose challenges and innovative approaches to reach win-win agreements, as a manager explains:

> *[An important bank name] came. They want to make an innovation department and they are looking for an innovative space. And a group came here from Paris. They wanted a talk about coworking. And I said "No, not coworking. Check the web. How many are you? 20. Do you want something innovative? Then, your 20 guys against our 20. How much time do you have? 2 hours. OK, then let's do a project in 2h", the [bank's] innovation department against 20 members of [our space]. The woman said that it was not possible. She flipped out. Now, they just called me back accepting. (Interview with manager of space N)*

Some CWS also engage in projects with external agents with a more social focus. For instance, space L, that focus on social innovation, has engaged with the local community and social agents (ONGs and civic associations of the neighborhood) to promote social innovation initiatives in a depressed downtown district. As the manager stated:

> *The city hall is very good at city branding but not at taking their initiatives at a lower level. We can help to approach the top to the bottom, to the citizenship. And once we have done it in [this district], we can extend it to others. (Interview with manager of space L)*

3.4.5. The interplay of the different dynamics of innovation

In the model of the localized dynamics of innovation, the different dynamics have been so far described separately. Nevertheless, our findings show that the four considered aspects (places, spaces, events, and projects) are intimately related and are interdependent in the

development of the innovative processes. Nevertheless, the sequential or causal link between dynamics is not pre-determined and depends on each case.
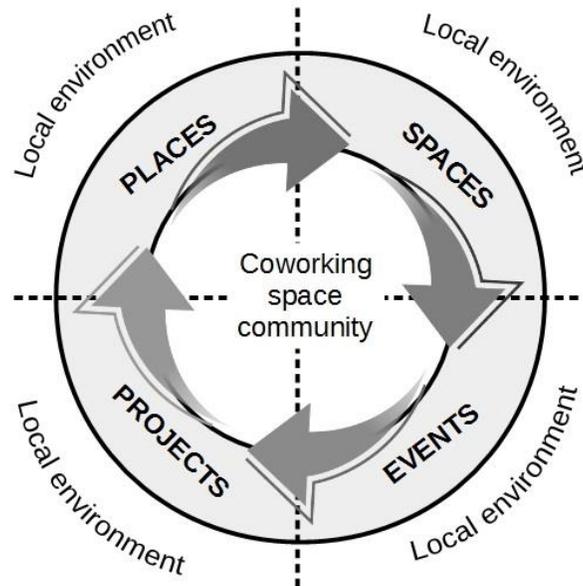
Figure 16. The interplay of the different dynamics of innovation

Figure 16 represents an example of how the four aspects are sequentially related but, as we show in these two short illustrative cases, the sequence of dynamics is not fixed.

Example 1: (Sequence: place → space → projects → events). In space N, the founders first rented a whole building in a lively district in Barcelona (place). The informal character of the environment, the intentional focus on collaboration and innovation, and low prices have gradually attracted creative coworkers (space). The community organizes an internal 36h-hackathon to develop an app for mobile phones (project). Finally, an event open to the public is organized in the space to present the app to 200 visitors (event).

Example 2: (Sequence: space → place → events → projects). A network of organizations focusing on social economy (space) decides to rent a large space to centralize all their different activities in the same venue (place). The different organizations (ONGs,

associations, cooperatives) organize meetings (events) that create a constant flow of visitors. The co-location of a diverse pool of people facilitates the development of collaborations among organizations and also with external actors (projects).

3.5. Discussion

Our results show the multiscalar dynamics of innovation in cities. The locus of innovation does not exclusively relies on the firms or on the clusters of firms located in the territory but rather in the complex ecosystem of innovation dynamics that take place between different levels. Cities represent pools of diverse and distributed knowledge that is created, interpreted and recombined at the level of individuals, communities and firms. Agents of the "middleground" such as coworking spaces serve as platforms to link creative individuals of the underground and firms of the upperground that benefit from the local external sources of innovation.

Research on the dynamics on innovation in territories has often considered the unit of the analysis of the cluster. Even though clusters are composed of firms of different sizes, the influence of the spillovers produced by actors outside market logics has usually been ignored. The dynamics of innovation that have been described in this article

This article contributes to the literature on innovation in cities by underlining the role that the middleground plays in the dynamics of innovation in a city, in particular CWS. Nevertheless, the comparison of the dynamics of innovation observed in CWS with the ones referred in the literature on clusters show parallelisms. The following observed similarities between the dynamics in CWS and in clusters are not exhaustive but illustrative of comparable phenomena at different scales:

Specialization and "localized capabilities":

Clusters' insiders are exposed to a large and diverse knowledge pool. Although each organization masters specific and limited capabilities, they can benefit of other members' capabilities by collaborating. In this way, clusters facilitate the integration of diversity and the combination of complementarities contributing to the cross-pollination of different bodies of knowledge and expertise that benefit a cluster's capacity of innovation and its differentiation through the creation of "localized capabilities" (Maskell & Malmberg, 1999a, 1999b). Similarly, the CWS that present a higher level of innovation, have

specialized and have progressively developed a "localized capability" difficult to imitate and that represent one of the most valuable intangible assets of the community.

Role of projects and events:

Within clusters, the collaboration between organizations with different knowledge bases is promoted by a common institutional frame that reduces the cognitive distance and facilitates communication. However, the frequent interaction and interdependence between insiders can also derive in the long-term into the creation rigid structures of relationships leading the cluster to a lock-in effect (Maskell & Malmberg, 2007; Visser & Boschma, 2004).

To avoid such lock-in effect, projects and events represent a way of integrating new knowledge, ideas and innovation from external sources by nurturing the "local buzz" and diffusing the ones locally developed thus creating "global pipelines" (Bathelt et al., 2004). The role of these "temporary clusters" (Bathelt & Schuldt, 2008; Maskell, Bathelt, & Malmberg, 2004; Maskell et al., 2006) in the innovation in clusters presents strong similarities with the role of events in CWS that we have previously presented in our findings.

Collaborations within clusters are often coordinated in the form of projects (Grabher, 2002a, 2002b; Lorenzen & Frederiksen, 2008). Projects facilitate temporary relationships where complementary bodies of knowledge are combined to reach an innovative endeavor. Project-based interaction also allows to change partners with agility and to adapt to constantly changing markets. *Ad hoc* collaborations allow the integration of different firms' capabilities and specialties ensuring the competitiveness of the involved firms and consequently their survival (Maskell & Lorenzen, 2004). Similarly, internal projects in CWS allow coworkers to combine complementary bodies of expertise and increase their respective competitiveness in the market.

Summarizing, our findings show that CWS could be assimilated to "microclusters" that present similar dynamics of innovation than clusters, but at a lower scale. Whereas the unit

of analysis of the cluster would be the firm, in CWS the unit would be the individual (considered as entrepreneur, independent professional or micro-firm).

3.6. Implications for policy makers

This article shows the impact of CWS as intermediaries between the "underground" and the "upperground" and their role in the dynamics of innovation in cities. The coworking phenomenon is relatively new and few policies have been aimed to study its effect on the innovative capacity of territories. Nevertheless, we consider that coworking merit the attention of policy makers as it can play a major difference in promotion of innovation in cities without implying neither a high cost nor risk. Most CWS are private for-profit startups run by entrepreneurs that work in the shared office, in the same conditions as all the other coworkers. CWS are generally low-profit small businesses and it is not uncommon that founders combine the development their own business simultaneously to the management of the CWS. In fact, the origin of the CWS is often the need of the founders to reduce their office rent costs.

Despite the low investment dedicated normally to the launch and management of CWS compared to similar publicly funded projects (like public business incubators), the outcomes of innovation within CWS do not only benefit the coworkers but also represent positive returns to the innovative capacity of the local environment. As we have shown, CWS contribute to the local dynamics of knowledge creation and sharing and can contribute actively in the local processes of innovation, linking talented individuals to innovative communities and firms.

In this view, policies that facilitate the creation of CWS and foster the relationships between them and the other local actors could lead to the local social and economic dynamization. Policies focusing on the creation of a favorable soil for CWS communities to emerge could represent an improvement of the local dynamics of innovation. For instance, these policies could communicate the advantages of coworking to independent professionals, offer fiscal incentives to CWS managers and members, or facilitate the launching of CWS in low-rent spaces. However, considering the autonomous and self-managed character of bottom-up communities, a too interventionist and directed policy could have counter effects and refrain the organic development of the community.

3.7. Conclusion

The cross-scale nature of innovation (Bunnell & Coe, 2001) implies that localized dynamics of innovation have to be considered at different levels. The literature on innovation in economic geography has traditionally focused on the territory level (nation, region, city) or organizational level (cluster, network, firm) without generally considering the role of communities or individuals outside firms in innovation.

This article contributes to fill this gap by considering the different levels involved in the dynamics of innovation in cities. The intertwined dynamics involve the formal and informal interactions between individuals, communities and firms. The study of localized spaces of innovation, like CWS, show that collective processes of innovation require platforms that allow the different involved actors to effectively communicate, share knowledge and cooperate. In our research, we show that places, spaces, projects and events facilitate crucial activities for the emergence and development of processes of innovation like, for instance, tacit knowledge sharing, diffusion of innovation, or coordination of diverse and complementary knowledge bases. Through these mechanisms, CWS contribute to the dynamics of innovation at different levels. First, at the individual level, members of CWS help each other and collaborate to advance in their professional activity. Second, at the community level, CWS represent specialized innovation communities that combine exploration and exploitation. As we have shown, in some cases these communities are able to compete with firms by coordinating heterogeneous knowledge bases. Third, at the firm level, the results of the explorative practices that take place in CWS can represent an external source of inspiration, ideas and talent for organizations. Fourth, at the local level of the district or city, CWS are platforms that bring together distributed knowledge around specific themes. CWS can also contribute to integrate the citizenship in collective innovation processes and acting as intermediary in top-down and bottom-up innovative initiatives. Fifth, at the global level, CWS host events that can represent "temporary clusters" were external actors can participate, sharing external knowledge and dynamizing the "local buzz". CWS also welcome foreign workers, facilitating their professional and social integration in the local environment while offering local actors opportunities to get in

contact with an external source of knowledge.

As a final comment, this article underlines that to understand innovation processes, individuals do not have to be considered as atomized actors but as part of innovation networks, communities and organizations. A cross-scale analysis contributes to fill a void in the current literature that often ignores the constant shift of levels in localized dynamics of innovation.

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Chapter 4: Different inter-organizational collaboration approaches in coworking spaces in Barcelona

Abstract

Inter-organizational collaboration plays a crucial role in the innovative capacity and competitiveness of firms. This article discusses the collaboration practices in localized spaces of collaboration through a study of different coworking spaces in Barcelona, following an inductive and qualitative approach. Three types of collaboration approaches are identified: 1) cost-related collaboration, where agents are motivated in reducing their operational costs and the transaction costs related to collaboration; 2) resource-based collaboration, where agents collaborate to learn or complement their resources by integrating external resources and sources of knowledge; and 3) relational collaboration, where actors engage in intense synergistic collaborative practices. The results show that each coworking space tends to focus on one kind of collaboration type that is influenced in different ways by the coworking space managers, The article contributes to the research on inter-organizational collaboration by explaining how the physical environment and the action of the space and community managers can facilitate the implementation of different collaborative practices among colocated economic agents.

Keywords:

4.1. Introduction

One of the most important trends in the organization literature is the collaboration between organizations. In an increasingly competitive, uncertain and complex environment, firms tend to focus on their core activities, engaging in collaborative activities for a large diversity of reasons, for instance, to decrease costs, learn from others or to have access to knowledge and resources from external sources.

Inter-organizational collaboration can be based on formal contracts or legal agreements, like is the case of strategic alliances or mergers and acquisitions. Nevertheless, many other collaborative practices between firms are neither managed by property nor market agreements and are led by "intermediate" or "hybrid" organizational forms (Borys & Jemison, 1989; Powell, 1987; Thorelli, 1986).

Coworking is an organizational form that by its own nature facilitates inter-firm collaboration. Coworking spaces are characterized by the co-location of economic actors that engage in different forms of collaboration, leading in some cases to the emergence of a highly-collaborative community of freelancers, entrepreneurs and professionals. The inter-firm collaboration in coworking spaces is not based on market or on hierarchies and thus could be defined as an intermediate organizational form.

Despite being an increasing movement that is exponentially expanding all over the world, there is a lack of research and there is not yet a clear understanding of why individuals and micro-firms are attracted to collaborate and how the collaboration takes place in physical co-location.

Furthermore, the study of the different of collaborative practices in coworking spaces contributes to the understanding of informal and emergent logics of inter-organizational collaboration beyond the existing literature that has mainly studied the formal collaborative practices between large enterprises.

This article aims to fill this gap by studying the different inter-organizational collaborative practices that take place in localized spaces as coworking spaces. Coworking spaces offer optimal research contexts for several reasons. First their reduced physical scale and the micro-organizations involved, make collaborative practices more visible in comparison to

collaborations between large enterprises where collaborative processes are more complex due to the plurality of actors and interactions. The intensity of the social interaction and the predisposition to collaboration of all involved agents (coworkers, space managers and community managers) also facilitate the observation of dynamics of collaboration.

The structure of the article is as follows. Firstly, the literature review section summarizes the research on inter-organizational collaboration based on the transaction cost economics, the knowledge-based and the resource-based views of the firm and the relational view. Secondly, based on a qualitative study on the collaborative practices in the coworking spaces in Barcelona, the article presents the three different inter-organizational collaboration approaches. Thirdly, we analyze the implications of our results for the collaborative practices between firms in a social and localized context. Before concluding, the limitations to the generalization of our results are exposed considering the specific research context while suggesting some topics for further research.

4.2. Literature review on inter-organizational collaboration

4.2.1. The transaction cost economics view

The theoretical core of the transaction cost economics (TCE) is that transactions between agents lead to uncertainty of their outcome due to the bounded rationality and opportunism, defined as "self-interest seeking with guile" (Williamson, 1985). To overcome uncertainty, transactions imply costs of negotiation and monitoring. To reduce them, agents might implement a structure "to infuse order in a relation where potential conflict threatens to undo or upset opportunities to realize mutual gains" (Williamson, 1999, p. 1090). This collaborative structure depends on the specific investments required by transactions. Economic agents will increase their performance, thus their competitive advantage, if the relation-specific assets, the collaborative structure and the nature of transactions are aligned (Silverman, Nickerson, & Freeman, 1997; Williamson, 1985). Consequently, agents engaging in collaboration in order to develop a specialization of assets will gain a competitive advantage (Klein, Crawford, & Alchian, 1978; Teece, 1987).

There are three kinds of specialization of assets (Williamson, 1985): 1) site specificity, 2) physical asset specificity, and 3) human asset specificity.

1) site specificity refers to the co-location of production and operations. Site-specific investments can contribute to reduce costs related to logistics costs like transport, inventory, and coordinating costs.

2) physical asset specificity, is related to customized and specialized tools and machines of production that are transaction-specific capital investments that allow product differentiation and customization.

3) human asset specificity refers to know-how and specialized information and knowledge developed by agents involved in long-term transactions. Mutual knowledge and transaction-specific knowledge increases communication efficiency, reducing costs and increasing competitiveness of agents collaborating.

Although co-investing in specialized assets will benefit productivity, according to TCE, the disadvantage of making specialized investments is that the more specialized a resource is, the lower its value in alternative uses becomes. Consequently, the owner is exposed to a greater risk due to opportunism and contingency compared to the owner of a generalized resource (Klein et al., 1978).

Following a TCE logic, that risk is reduced by agreeing legal contracts. As asset specificity increases, contracts tend to increase in complexity (Macneil, 1978; Williamson, 1985). TCE predicts that transaction costs will necessarily increase in relation-specific investments. Nevertheless, empirical research has showed the inverse phenomenon: more specialized types of collaboration imply lower transaction costs (Dyer, 1997).

4.2.2. The knowledge-based view

Confronting the TCE focus on the study of the reduction of transaction costs, Zajac and Olsen (1993) suggest to center collaboration on the maximize transaction value. TCE predicts the structural outcome of collaboration depending on the nature of the transactions between the agents involved in the collaborative practices. In opposition, the resource-based view (RBV) affirms that the structure of the collaboration will depend on the resource profiles of agents and its alignment.

Building on resource-based view of the firm (Penrose, 1959), several researchers have described inter-organizational collaboration as a source of resources (Eisenhardt & Schoonhoven, 1996; Gulati, 1999; Rothaermel, 2001; van de Ven & Walker, 1984) and sharing knowledge as the main goal of strategic alliances and interfirm cooperation (Inkpen & Crossan, 1995; Kale, Singh, & Perlmutter, 2000; Khanna, 1998; Larsson, Bengtsson, Hendricksson, & Sparks, 1998; Mowery, Oxley, & Silverman, 1998; Simonin, 1997, 1999). Most of these studies have assumed that the goal is to acquire knowledge through learning. In the next section, we develop the organizational learning perspective of collaboration.

4.2.2.1. Inter-organizational learning

Inter-organizational learning is critical to ensure competitiveness. Organizational learning is often enhanced by collaborating with other organizations (March & Simon, 1958; Powell, Koput, & Smith-Doerr, 1996). Organizations that are able to capture knowledge and ideas that are generated outside their boundaries are able to develop a competitive advantage (Chesbrough, 2006; von Hippel, 2007).

By developing knowledge-sharing routines (Grant, 1996), firms can increase their performance and innovation. The type of knowledge shared is relevant. A general distinction in the literature distinguishes between codified (or explicit) and tacit knowledge (Polanyi, 1966). Whereas codified knowledge can be easily transmitted through distance without loss, tacit knowledge by its "sticky" character and context-relation is more difficult to codify and consequently to transfer and imitate (Grant, 1996; Kogut & Zander, 1992; Nelson & Winter, 1982). Geographical co-location and situated learning and practices (Lave & Wenger, 1991) facilitate the transmission of tacit knowledge. As a result, collaborative inter-organizational practices transferring tacit knowledge can result in the development of knowledge that can be difficult to imitate by potential competitors.

Nevertheless, in order to be able to successfully integrate new knowledge from external sources, organizations need to develop the required "absorptive capacity", defined as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128). This capacity is however influenced by the context of the interaction between organizations. Knowledge sharing and collaborative practices typically involve an iterative exchange processes build through frequent, trustful and face-to-face interactions of members of the involved organizations that increase the chances of developing the absorptive capacities of both partners (Arrow, 1974; Badaraco, 1991; Daft & Lengl, 1986).

4.2.2.2. Knowledge accessing

The knowledge-based view of inter-organizational collaboration and alliances has generally

presumed that the goal was to facilitate the organizational learning that is the knowledge acquisition of both partners. This view ignores another potential intention of collaboration: not in acquiring, but in accessing other organization's knowledge (Grant & Baden-Fuller, 1995, 2004).

Collaboration might avoid some of the problems of market transactions. For instance, by limiting opportunism by converting single transactions into series of multiple transactions, relationships reinforce inter-organizational trust (Gulati, 1995; Ring & van de Ven, 1992; Simonin, 1997; Teece, 1992). Even though collaborative structures, such as alliances, generally lack the authoritative power of hierarchies to organize and coordinate knowledge integration, they present the advantages of combining the benefits of knowledge specialization and the flexibility of integration.

In the case when a large, diverse, and complex ranges of knowledge bases have to be integrated, the most efficient mechanism for knowledge integration are through inter-organizational forms of collaboration like alliances. Collaboration can help organizations to have access to others knowledge bases and to profit from under-utilized knowledge by giving access to partners (Grant & Baden-Fuller, 1995, 2004). This dynamic double flow of knowledge import and export provide firms that engage in collaboration with higher flexibility, and lower time-to-market in uncertain and dynamic markets.

4.2.3. The relational view

The two perspectives on inter-organizational collaboration that have been described so far have greatly contributed to the understanding of why organizations engage in collaborative arrangements. However, their level of analysis is the single firm and they overlook the systemic effect that imply networks of collaboration. For instance, the TCE perspective consider the mechanisms to reduce costs of an organization, and does not focus on the effects of collaboration on the overall reduction on transaction costs of the whole network of organizations. In a similar fashion, the RBV and knowledge-based view of collaboration is based on the resources and knowledge that are owned and controlled by single firms,

overlooking the overall resources that networks of collaboration have.

The relational view on inter-organizational collaboration focuses on the effects of the whole network of firms involved in the collaboration (Borgatti & Cross, 2003; Dyer & Singh, 1998). Research on interfirm collaboration in networks of organizations ranges from studies on strategic alliances to industrial districts (Inkpen & Tsang, 2005). By considering "the dyad/ network as the unit of analysis and the rents that are generated to be associated with the dyad/network" (Dyer & Singh, 1998), the relational view suggests that organizations might be motivated to collaborate sharing knowledge and resources considering the resulting outcome at the network level, rather than considering the direct benefits that they could gain (Gulati & Singh, 1998). Later on, those collective returns of relational rents would benefit individual firms. From this perspective, organizations should not seek to capture new knowledge and resources while protecting their own, as advocates the RBV, but rather freely share their resources with other organizations, expecting future returns from the collaboration (Dyer & Singh, 1998). Such a relational collaboration strategy only makes sense if the firm considers that the potential value of the collaboration exceeds the disadvantages of knowledge spillovers to competitors. In this line, Andrews (1971) claimed that the strategic actions of firms respond to the match between the firm's current resources and the availability of new ones. In contrast to the RBV approach that focuses primarily on the existence or absence of firm's competences, a relational view takes in consideration the strategic opportunity that firms perceive (Gulati, 1999) and the network resources that are created through the firms' participation in interfirms' networks (Barney, 1986, 1991).

4.3. Case study

4.3.1. The coworking phenomenon

The term coworking was first used by Brad Neuberg, a computer engineer that in 2005 founded the coworking space Spiral Muse in San Francisco (Botsman & Rogers, 2011; Deskmag.com, 2013; Hunt, 2009; Jones, Sundsted, & Bacigalupo, 2009). A coworking space can be straightforward defined as an "open-plan office environments in which they work alongside other unaffiliated professionals for a fee" (Spinuzzi, 2012, p. 399). Coworking is an alternative to working alone at home or in an office for a company. It not only refers to a physical space but also to a way of working in co-location. Coworking spaces distinguish themselves from mere shared offices by focusing on the community and its knowledge sharing dynamics. Coworking.com defines coworking as: "a global community of people dedicated to the values of Collaboration, Openness, Community, Accessibility, and Sustainability in their workplaces" (Coworking.com, n.d.).

Concerning this article, coworking spaces are defined as localized spaces where independent professionals work sharing resources and are open to share their knowledge with the rest of the community.

Coworking has emerged as a global phenomenon together with the increasing trend of independent workers, freelancers and free agents (Pink, 2001).

Currently, there are more than 100,000 people around the world that are members of one of the 3,000 coworking spaces running around the world (Deskmag, 2012). In Europe as in the United States, there are annual conferences dedicated to Coworking where CWS managers meet, share experiences and discuss about common issues. The majority of coworking spaces are small local private startups that run independently with only one or two locations. Nevertheless, some of them are organized in associations to offer more services and create more values for their members. There are several networks of coworking spaces that operate CWS in several locations, such as The Hub, NextSpace or Urban Station.

Being a new and emergent phenomenon, there is still few publications on coworking aimed to practitioners or academics (Davies & Tollervey, 2013; DeGuzman & Tang, 2011; Forlano,

2011; Jones et al., 2009; Jones, 2013; Kwiatkowski & Buczynski, 2011a, 2011b; Nakaya, Fujiki, & Satani, 2012; Spinuzzi, 2012; Townsend, Forlano, & Simeti, 2011).

4.3.1.1. Barcelona as a coworking hub

In Barcelona, more than one hundred spaces define themselves using the term coworking. Barcelona is the European city with the higher density of coworking spaces per inhabitant and one of the main hubs for coworking in Europe. New coworking spaces are being inaugurated in a regular basis, while many others are still almost half empty. As a space manager put it: "Currently, there are more coworking spaces than coworkers".

Despite of the fact that there are many CWS in Barcelona, coworking as a practice is not very well known. A big part of the effort of the managers of coworking spaces is to diffuse what coworking is and which are the benefits for freelancers and autonomous professionals. About one third of the CWS of Catalonia have recently collaborate to create the Catalan association of coworking spaces (cowocat.cat) whose first objective is to promote coworking among Catalans and foreigners.

The main reason of the coworking explosion in Barcelona is due to the economic crisis that Spain has suffered in the last years. From one side, many companies had to reduce their workforce leaving underutilized workspace. To monetize the empty spaces, some of them have been rented as coworking spaces. From the other side, the effect of the crisis has increased the difficulty to get a job in firms and thus, the number of freelancers, entrepreneurs and autonomous workers has increased. Coworking spaces represent third places (Oldenburg, 2002) where they can work, socialize while avoiding the high costs related to renting an office.

Barcelona has also become a European coworking hub because is an attractive city for foreigners. Many professionals have moved temporarily or for long periods to work in the city and coworking has offered them a possibility to have a flexible workspace and get in contact with the local social and professional environment.

Nevertheless, coworking has also an historical base. It represents also a natural evolution of the Catalan tradition of associativity and collectivism that characterizes the social-economic

substrate of the Catalan society.

4.4. Methodology

This research was based on an inductive, qualitative methodology. A qualitative approach can help explain how theoretical principles are enacted in particular cases (Van Maanen, 1998), in particular, those cases that defy existing categories or theoretical explanations. Furthermore, qualitative methods are most suitable for phenomena that are novel and that have not been previously theorized (Eisenhardt, 1989).

4.4.1. Data collection

The study is mainly based on two sources of data: semi-structured interviews, and direct observation. Secondary data like the content of the spaces' web pages, online forums and discussion mailing lists has also been taken in consideration.

Semi-structured interviews. The main sources of data were semi-structured interviews. Respondents represented two different groups of actors. The first group consisted in 28 interviews with managers and members of 21 different coworking spaces. Interview questions focused on the motivations to engage in collaborative activities and on the activities of the community related to interaction and collaboration between members. As part of a triangulation strategy, a second group of 13 interviews were conducted: four to managers of similar spaces from other European cities (Berlin, Brussels, Florence, and Madrid), and nine to specialists from Barcelona that have followed the evolution of the collaborative spaces in the city. These individuals were researchers, practitioners and policy makers that represented what Eisenhardt and Graebner (2007, p. 28) call "highly knowledgeable informants who can view the focal phenomena from diverse perspectives".

Direct observation. The second main source of data was non-participatory observation of the community activities. In total, I conducted about 30 hours of formal observation and several more of informal observation. Following observations, I took notes that helped me to build a more comprehensive understanding of the environment, the knowledge dynamics

and interactions between the members of the communities.

4.4.2. Data analysis

The data analysis was based on an open ended and inductive approach (Strauss & Corbin, 1990). The research conformed to the principles of grounded theory from cases (Dougherty, 2002; Eisenhardt, 1989; Yin, 1984). Data analysis began as the field work began: I wrote commentaries on each interview and observations, noting emerging themes. Interviews were transcribed the same day of the interview or the day after. Transcriptions were progressively coded in order to build an initial list of themes and codes for analyzing the data. Themes and codes emerged from the data rather than being taken from theory or previous research (Agar, 1980). In a second stage, I explored how the different codes and categories were interrelated configuring three types of collaboration approaches characterizing three types of coworking spaces. The coding process followed the approach suggested by (Strauss & Corbin, 1990) in terms of open, axial and selective coding, while iteratively moving back and forth between open and axial coding several times. The data was analyzed through an iterative process, and categories subsequently developed that informed further rounds of interpretation.

4.5. Results

Our study case addresses the research question: How is collaboration enhanced in coworking spaces?

The collected field data reveals three sets of distinct but complementary collaborative approaches that lead to different collaborative dynamics and types of coworking spaces. These three approaches can be summarized as follows:

1. Cost-based collaboration: The main goal of collaboration is based on the reduction of operational or transaction costs.
2. Resource-based collaboration: Agents collaborate driven by need of learning or having access to new knowledge and resources.
3. Relational collaboration: Agents engage in collaboration seeking synergistic results, investing actively in the community building dynamics.

As we explain in detail in the analysis of the findings, depending on the collaborative approach, the practices of both coworkers and managers of coworking spaces will differ. Furthermore, the managers of the spaces might reinforce or even ignite the collaborative dynamics among the members of their coworking space, nurturing the emergence of a collaborative community that might eventually expand outside the coworking space boundaries. Despite manages can influence collaboration, the final results will depend on the will and action of the members.

Even if three approaches are conceptually differentiated, they are not completely independent in the practice. Some spaces might show different degrees or combinations of the three. However, the three approaches can be quite clearly distinguished in the coworking spaces in Barcelona.

As we will show, the three dynamics are interrelated as they increase in collaborative complexity and engagement of community members and managers. The different approaches are not static. The emergent collaborative communities of a space might begin motivated by a simply reduction of operational costs and might evolve to a highly

collaborative and efficient community. Contrarily, a poorly managed space might demotivate collaboration and finally be forced to leave the market.

Our findings are schematically in Figure 17.
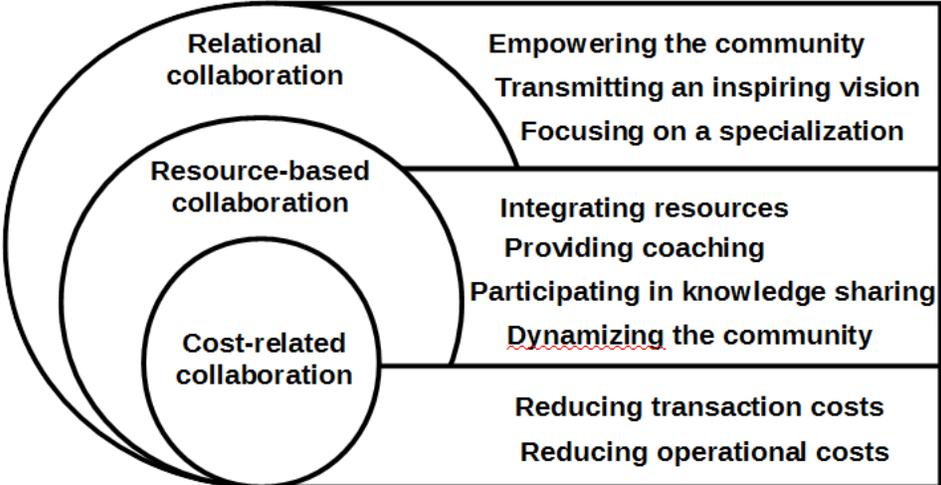
Figure 17. The different collaboration types

4.5.1. Cost-related collaboration

Coworking is a new phenomenon. Generally, self-employed professionals approach coworking spaces for the first time ignoring what coworking is about. In many cases, they are initially attracted by escaping from the distractions and lack of self-motivation that working alone at home represents. All coworkers interviewed by Spinuzzi (2012) reported that had tried working at home but were unsatisfied due to experienced distractions, self-motivation problems, and feelings of isolation. The need of socialization and leaving home to work make that one of the main reasons of choosing a coworking space is its location, either near home or in a convenient location (near customers for instance).

Coworkers, apart from the socialization aspect, soon realize that coworking represents also a cost reduction. Entering a coworking space might represent a reduction in the operational costs of new founded start-ups but creating a coworking space might also represent a cost reduction for an existing organization.

In this section we discuss the reasons to collaborate driven by cost reductions. These costs

reductions are not only monetary savings related to sharing an office or assets, but also the reduction of transaction costs linked to the proximity to other agents, located in the coworking space or in the surroundings.

The combination of the opportunity of socialization, a convenient location, and the cost reduction represents in many cases the base of collaboration. A coworking space manager in Barcelona summarizes it in this way:

> *Location is important. We are very centric. Our price is very competitive, not too expensive nor very cheap. In relation to what we offer, it is a very good deal. But more importantly, is that there are very good vibes. It is a very pleasant environment (Interview with manager of space I)*

4.5.1.1. Reducing operational costs

4.5.1.1.1. Reducing general costs

In comparison to working at home, coworking represents a cost. However, in comparison to renting an office, coworking represents a cost reduction. Even if cost reduction is not the main driver of coworkers (Spinuzzi, 2012), the cost of membership is a decisive variable for many coworkers. Coworking spaces in Barcelona clearly compete in price, and price differences might represent to have the space full or almost empty. As a manager explained:

> *We had people coming for a short time and who went to other spaces six months later. [...] We were five coworkers and we decided to reduce the membership 10 Euros: a month later, seven new members had come. Our fees are very competitive and the space is very good to work. We thought that it would be good to have a nice space and also a good price. The idea is that the whole space is used. We prefer to have people at a reasonable price rather than having only three persons paying a high price. (Interview with manager of space K)*

Coworking spaces not only reduce the direct costs of coworkers, but also simplify the accountability of their costs and optimize their working time. A manager explains these

1 4 6

other advantages:

> *If in your business plan you consider a monthly expense of X, it makes your job much easier. You know exactly your expenses. [...] You just come to work. If a package or letter comes by mail, we deliver it in hand. We want coworkers to feel like professionals that can just focus on their work, with a service that supports them. (Interview with manager of space K)*

Coworking also can represent to get more for less. For instance, a manager explains by sharing, coworkers can have access to a better space that would normally get if rented just for a single firm:

> *People come and tell us that we have the best coworking space in Barcelona. There is a lot of light, there is a lot of space and a huge terrace [...] They love this space. People choose this one for the physical space. [...] We could not afford the space we have here if we were only us. (Interview with manager of space J)*

So far, we have exposed some of the reasons of professionals to collaborate by sharing costs by entering a coworking space. However, not only members reduce costs, also founders of coworking spaces. Founders usually are coworkers themselves, alternating their role as space managers with other professional activities. A manager explained how coworking gave them access to a bigger working space:

> *We were looking for a space for us [our startup]. We found this space that is very big and we talked to the landlord to convert it into a coworking space managed by us. We are a company that develops software, but we also manage the space. (Interview with manager of space J)*

The Spanish crisis might also be a reason to start a coworking space. Some need to look for new economic resources to maintain the same working conditions reducing the cost:

> *In 2005, everybody had money. Everyone pays a table here. We are seven associates. When the crisis came, incomes decreased and this is a very big space and it is very expensive. We were very well here: central, nice to receive clients, a training room for training and discussion groups, very useful. To leave this and look for another space, smaller and cheaper... We decided to get involved in the*

1 4 7

management and share it with other people. [...] I used to pay 400 euros for my table, now I pay 250. I have reduced my fee but I pay the same as the other coworkers. (Interview with manager of space I)

This situation is especially significant in the case of architects that have seen their income drastically reduced due to the crisis:

This is an interior design studio. We were 25 persons four years ago and our industry was the most affected by the crisis. We set up a huge office of over 400 m² with 25 people and, after the crisis, we came to this office that we own. In fact my coworking is the result of a necessity. [...] So it is not for me a business but a way to help me to keep mine and on the other hand share a little humanity. (Interview with manager of space M)

In other cases, managing a coworking space allows managers to avoid all their office costs:

When we will rent eight more tables, the benefit will be higher and we will have access to an office that we will not pay. (Interview with manager of space K)

4.5.1.1.2. Costs related to specific assets

As we have shown, in some cases, the reduction of costs is relative to the cost of renting an office. In some other cases, the cost reduction is relative to the required investment to fulfill the needs of coworkers. For instance, professionals needing specific tools of machines, like designers, or architects, might be interested in sharing costly specific assets, as plotters, prototyping machines or 3D printers with other professionals. Coworking spaces that base the collaboration in sharing the costs of specific assets tend to specialize around professional domains. These coworking, apart from offering a place to work, usually also offer complementary services to their coworkers, as a manager explains:

Technology is the differential factor of our space. We have our own servers and symmetric connections. To upload 2 Gb at home, you have to leave it all night and wait for the connection not to break. Here, we have a data center, a specialized infrastructure for technology companies. [...] We cannot compete in price with the big American data centers. What we do is to compete with quality and safety.

Customers know that our servers are not in Alabama, but in Catalonia. We offer hosting on servers that are not saturated. (Interview with manager of space D)

However, investing in expensive specific assets does not necessarily attract specialized coworkers. The manager of a coworking space inside an interior design studio had difficulties to attract architects and designers as coworkers:

I don't know. I have seen some reluctance in the world of architecture and interior design. It surprises me, here everything is set. We have machines, plotters, everything. To equip such a studio is a fortune. Now, to come here, and use it and just leave when I don't need it... but no. [...] In the beginning I wanted that the coworkers had our same speciality. Now I have to hire people from outside. To decorate a hotel, I would have hired my own coworkers if they would have been here. (Interview with manager of space M)

4.5.1.2. Reducing transaction costs

So far, we have presented some elements to understand why agents collaborate in order to reduce costs. In this section we focus on how agents reduce costs in order to collaborate. By being in co-location, coworkers can easily socialize and interact in an informal manner, and thus reduce the costs related to seeking information, reaching agreements, or controlling partners. In other words, geographic proximity can reduce the transaction costs related to collaboration.

Coworking facilitates physical proximity at different levels (city, district, coworking space) to allow collaborations with a face-to-face interaction.

4.5.1.2.1. Access to privileged location

Urban coworking spaces allow professionals from outside the city to have access to local customers, suppliers or colleagues.

Barcelona is an attractive city for foreigners to work in. Coworking spaces are a popular option for foreign professionals that come to work in Barcelona temporary:

Almost 70% of members are foreigners, in our space and also in the other spaces. [...] In Barcelona, there is a high percentage of itinerant foreigners that work for companies from all over the world and that are used to work in similar spaces all over the word. [...] It is people that is not suffering economically speaking and that is very used to these new ways of working. (Interview with manager of space F)

Having the possibility to work in Barcelona is also important for professionals that live in the periphery of the city and need to meet customers and suppliers in the city center:

The first variable that a coworker considers is the proximity, and second the community [...] There is people that comes from Maresme [20 km north from Barcelona] and come to our space because of proximity. We are the first coworking space that they find coming on the motorway. It is a kind of proximity that we were not expecting. (Interview with manager of space D)

Two or three live in the neighborhood, but not the rest. There is a guy that lives in Olot [100 km from Barcelona]. He is a carpet salesman that establishes Barcelona city center as his meeting point and then he moves around. This office is very good located and his center of operations is here. (Interview with manager of space K)

4.5.1.2.2. Collaboration in co-location

Working in co-location allows reducing the transaction costs of seeking for collaborators, and following up the progress of the collaboration.

Among our coworkers, there is collaboration. For example, the other day a web designer, a coder and a SEO [Search Engine Optimization specialist] worked together in a project. To work with the people that surround you, it is all advantages. For instance, we had a Brazilian girl who is a web designer and she had all her team in Brazil. She brought all of them here. Now they do all the design here. The emergent countries like Brazil are not what they used to be. It is priceless to do everything with everybody in the same space: the coder sitting next to you... (Interview with manager of space D)

There is collaboration. For instance, the designer got a job from a customer that also needs a website. He just turned his back and told the web designer. (Interview with manager of space H)

There are a lot of opportunities. Someone might say "I am a writer but I need a

website and I can't pay. Another might do websites and needs a writer. Someone might be blocked, another might be a coach. (Interview with manager of space E)

In the above examples, collaboration is based on the exchange or subcontract of services that complement each other. The services offered by the providers are not unique or exclusive and they could have been found outside the coworking space. Co-location allows actors to get to know the other coworkers and in case they require the services they offer, they will tend to contract them from their colleagues that from an external supplier.

In other cases, sharing a coworking space helps coworkers to collaborate to subcontract a peak of work when they lack resources. In this way, working next to other workers of the same professional specialty provides a buffer capacity in some cases, and job opportunities in others, like some managers mention:

> *We have here 5 programmers and almost all are web coders. They did not come together. They met here and they are now collaborating. Three of them have arrived this month and they are already collaborating with the others: "Look, I can't manage alone with this project, help me with this". This people have a lot of work. Lucky them. An Englishman that just started a company is collaborating with another programmer. They all help each other, but of course, if they do a job for another, they get paid. (Interview with manager of space G)*

Collaboration opportunities among coworkers might not be provoked from an intentional effort of searching partners, rather by emerging through the daily social interaction among coworkers, as in the following examples:

> *There is an interior designer that knew nothing about construction and she collaborated with an architect in a renovation project. If they need something that they can find here in the community, they take it from here. (Interview with manager of space G)*

> *Actually we are doing the flat renovation of the mother-in-law of a girl that works here. We have ordered 4000 m2 of carpet for the Mobile World Congress to another coworker that had started his company six months ago. I saw the carpets, checked the price with my boss and gave him the order. He is very happy. Definitely yes... (Interview with manager of space K)*

More than collaboration in projects, we have new possibilities with potential customers. The guy that does consulting for companies has given a contact to a friend of mine. The architect benefits from all our documentation. I have used a lot the services of the translator. Everybody is very happy. The judge helped another one that had problems with lawyers. This is the maximum collaboration that has emerged, rather through personal contacts than professional relationships. (Interview with manager of space M)

These collaborations are very dependent on the coworkers' informal daily interactions. Social activities might reinforce the social bonds of coworkers, as in this example:

Every Thursday we go to eat lunch together. We organize things. We will go to have a barbeque with the children. Everybody knows each other and what their work is about. If someone needs a service, the guy of the next table might help. There are a lot of collaborations. (Interview with manager of space G)

However, in some cases social interactions depend exclusively on the coworkers' initiative, risking a lack of collaboration among coworkers:

I do not urge people to collaborate. It depends on the kind of people we have. They are closed units of work. We have done some collaborations. When we had some parts of our software to design and if we had a designer near, we used to ask him. It didn't happen much, though. (Interview with manager of space J)

In the above presented examples, collaboration is a "functional collaboration" rather than a "thematic collaboration" as a manager describes it.

4.5.2. Resource-based collaboration

In the cost-related collaboration, coworkers are motivated by reducing their operational costs or the transaction costs related to collaboration. As we have shown, in previous examples, collaboration is done on the basis of reaching the lowest cost. Agents are driven by self-interest and in most cases, collaboration emerges as a non-intentional effect of social daily interaction.

In many other cases, though, coworkers engage actively in collaborative practices,

participating in activities and events to search resources to learn from or simply integrating them with their own resources to enlarge their professional possibilities.

In this section, we described the different collaborative practices that benefit this resource-based collaboration. They can be summarized as dynamizing the community, participating in knowledge-sharing events, providing coaching and integrating resources.

4.5.2.1. Dynamizing the community

Collaboration is often based on the need to combine different types of knowledge bases and resources. Nevertheless, to identify, select, combine adapt, integrate or use external resources are not simple tasks. Part of the role of coworking spaces managers is to help coworkers collaborate together, as a regional policy maker assures:

> *The facilitator or the responsible of the space plays a fundamental role in order to have interaction and collaboration between the users of the space. (Interview with a representative of the Catalan Government)*

Some managers understand that the dynamization of the community is crucial and it is their competitive advantage to attract coworkers:

> *We are professional managers and we are dedicated 100% to the coworking activities. [...] I am the project manager; this function is called community manager in the USA. I take care of the community of the space and of the external projects, the relationship with other spaces, etc.(Interview with manager of space C)*

> *I have here people that have been to other spaces where there was no dynamization and that have come here because there is complementarity and dynamization. (Interview with manager of space H)*

4.5.2.2. Participating in knowledge-sharing events

Coworking is about creating a community (Coworking.com, n.d.) and social events play an

important role in the community building process. Events can allow members to know each other and their respective projects, interests and specialties. Events open to people from outside the space facilitate also the knowledge cross-pollination and the exposure to external knowledge. Events offer the opportunity to coworkers to scan for new knowledge and resources, identify opportunities and make contacts for potential collaborations. Events attract individuals with similar interests, reinforcing the local community around specific themes. For instance, events contribute to create a local cluster around social economy in the coworking space B:

> *There is an association that unites a lot of associations sin Catalonia and in Spain interested in ethic finances. The day when there is a general assembly, it is plenty of people here. [...] Each association has its own activity. There are lots of people that flow in this space. We were not conscious of that in the beginning but now we are. The fact of having a space, has positioned us relatively to the kind of entities and groups that are here. (Interview with manager of space B)*

In this way, the combination of the continuous co-location of the coworking space community with the sporadic co-location of an external community, nurtures the emergence of a local thematic community:

> *A good very good thing is to create a community beyond the 15 people that can cowork here, and to use the space that we have here to do monthly meetings to talk about communication, with about 20 people. In three months, maybe we will be a community of about 50 people, even if not all are coworkers from our space. We create synergies beyond the physical space. (Interview with manager of space A)*

Events also allow managers to get more visibility for their space and to gain reputation. Participants to events are also potential future coworkers:

> *[Events] bring us recognition, reputation and a flow of visitors. Of course, the idea is also that people get to know us. The idea behind coworking is to share, not only the space but also knowledge. And a way of sharing this knowledge is through our club's events. Some of the participants have afterwards become coworkers. How many? Maybe 10%. (Interview with manager of space F)*

4.5.2.3. Providing coaching

Managers of coworking spaces help their coworkers to develop their collaborative skills and to find new opportunities to collaborate.

In some cases, coaching activities are internal groups meetings, where coworkers give support and provide advice to each other. For instance, a manager explained:

> *One of the main tasks of managers is the dynamization. The first thing we do when a new coworker comes is to present him and his project to the community. [...] We also use our [space] club for members that want to present their project. We contribute to knowledge sharing. If you are in a critical moment of your project and you need that another professional validates it, then we can do this contribution as consultants. We organize monthly meetings where, through a methodology of active listening, the group presents doubts about their projects. The doubts need to be very specific, for instance, "how can I get to that difficult client? ", and the rest of us tries to help, for instance "I have this contact that might help you" or "have you tried to do this proposal differently?". It is a very practical help group. Everybody can participate. (Interview with manager of space F)*

Other managers focus their coaching support to members that, by their personal or professional characteristics, have more difficulties in collaborating with others. For instance, a manager underlined that shy individuals are the ones taking more advantage of their services:

> *The profile of a member of a coworking space is not a salesman. A salesman is able to meet people wherever he is. This is about creating opportunities for people that do not have this profile. Doing events, [...] or doing anything that increment the chances for people to meet. [...] For instance, we had a very timid person, a translator that had difficulties to relate with other coworkers. I introduced him to other members, t other translators... (Interview with manager of space C)*

Similarly, another space gives support to professionals that need coaching about their careers:

> *One of our partners works as a coach and she has a lot of contacts. She created a group of people that were in a professional transition. They were unemployed and*

were searching new challenges. Some of them had their own projects and they started working in our space as coworkers. (Interview with manager of space F)

As in the previous example, in some spaces coworkers needing professional support get better deal as long as they are aligned with the values and focus of the coworking space. This can also benefit on attracting a certain type of coworkers:

The space has two floors, the business zone upstairs, where coworkers pay more. Downstairs, is more about patronage, even mentoring. If you are between 18 and 30 years old and are a techie, we give you a better price. We even let you pay half of the price during some month and if your business progresses, we go back to the normal price. It is a combination of what people need and what we need. In an indirect way, the community brings community. If you have lemons, you sell lemons... (Interview with manager of space D)

In some cases, accepting coworkers in an organization is a way of coaching entrepreneurs in the practice of the field. For instance, space B was initially shared by a group of cooperatives that focused on social economy. They decided to share their experience in social business creation to give support to entrepreneurs that were interested in sharing their space, as one of the managers explained:

In our group, we created a work group thinking that we had a long-time experience in creating alternative businesses and now that there is a general interest for the social entrepreneurship and that we want to create supply and demand with certain values, why don't we create our own initiative for entrepreneurs with this same profile? (Interview with manager of space B)

4.5.2.4. Integrating resources

Coworking offers access to a diverse spectrum of resources that can be integrated to offer new services. These collaborative practices are different from the ones described as cost-related collaboration where agents were driven by the self-interest of filling a resource gap in a given project. In opposition, in this section we present cases of collaboration which goal is to create new projects, products or services by the combination of different resources of a group of coworkers. The outcome is a new collaborative endeavor. Even if,

as it is the case in cost-related collaboration, the different needed resources that are integrated could have been found outside the coworking space, co-location and daily face-to-face interaction between coworkers facilitate the process of integrating and coordinating resources.

The projects developed in these collaborations can be assimilated to the services offered by a single firm:

> *The future is to offer integral projects, making that everybody comes together to develop a project as a temporary union of firms. [...] We know that renting tables is not a business. We want to create and support this need to do projects together. We think that this might be a possibility to develop a business for us. (Interview with manager of space H)*

This project-based collaboration reflects the current trend of decentralization, outsourcing and externalization of resources. From this perspective, coworking spaces offer a flexible organizational structure that can adapt to dynamic markets. As a manager clarifies:

> *Currently, companies are decentralizing a lot and externalizing many types of services. One of our objectives is to offer time-limited services to firms. In this way, firms could outsource some work and we could offer integrated services involving our members. This would be a great way for freelancers to understand the corporate world and teamwork. (Interview with manager of space H)*

Coworking allows professionals to offer integrated services that could be developed individually. However difficulties coordination and a lack of experience in this type of collaboration might represent an obstacle to further collaboration.

> *I am interested in collaboration beyond our space. I think that by collaborating we can face much bigger projects than individually. But there is a lack of culture among freelancers. It is very difficult if there is not an agency. These handicaps cause a lack of opportunities. Maybe the problem is that we like to be employees. (Interview with manager of space A)*

The lack of a structure that manages the coordination and integration of the resources represents a difficulty to collaboration.

I opened a coworking space after thinking about collaborative work. I was employed in a multinational company and I observed that what the big communication firms do is to subcontract freelancers for their projects. They are big firms but not all workers are employees. I quit that firm to do start a consultancy to focus on strategy. I started this coworking thinking that if we can look for people that are currently being fired from multinationals, we could start big collaborative projects. That is the idea behind our space. [...] But one of the problems is how to organize ourselves. The leadership and the management of collective projects are very complicated. To be freelancer for a company is very easy. "do this, I pay you this" but for a group of peers, it is very complicated. (Interview with manager of space A)

Establishing the budget of a collaborative project might be also problematic, as well as the distribution of the benefits proportionally to each member implication and effort. In opposition, in a traditional hierarchical structure, the coordination and retribution of resources are simplified ruled by formal contracts and market prices. As a manager explains:

We can be considered as the new model of agency. Our model is powerful but it is very complicated. The price of the resources is fixed by the market. If a designer wants to be paid a lot, the agency can tell him "if you don't do it for this price, another will take the job". In a collaborative model, this is much more difficult. On the one hand, there is the value and on the other, the possibility of being substituted. The value is how important is the media strategy in this project. The "substitutability" is related to the number of persons that can do this same job in Barcelona. [...] In a project with peers, this has to be very clear. In a collective project that we did, I had a hard time fixing the budget, the price. It finally didn't work out but in case it would have succeeded, we would have had problems to distribute the income. Or imagine we would have to cut the budget somewhere. It is delicate.   (Interview with manager of space A)

4.5.3. Relational collaboration

The cost-related and the resource-related types of collaboration lay on the principle of collaborating to benefit all the implicated agents individually. In a resource-related perspective of collaboration, the focus of the managers of spaces was to give individual support to increase the changes of each coworker to collaborate with others. In this section, we present other types of collaborative practices that are based on the resources that are

developed by the whole community rather than on the sum of the resources of the different agents of the community. From this perspective, the collaborative practices are mainly focus on finding a synergistic effect of the collaboration. In other words, practices focusing on relational collaboration are based on the premise that the outcome of collaboration is superior to the sum of the parts involved. As we show in this section, practices to facilitate relational collaboration are centered on the community as a whole rather than on collaborating agents.

4.5.3.1. Focusing on a specialization

Most coworking spaces foster collaboration by seeking to put in contact different and complementary resources and knowledge bases. Co-location is however not a sufficient condition. In order to facilitate knowledge sharing and fruitful communication, agents have to have the sufficient absorptive capacity to be able to recognize, assimilate and apply new knowledge from an external source. Either by an organic process of natural selection or by an intentional selection process by the space managers, some coworking spaces tend to specialize in a specific field. Specialization does not mean that coworkers tend to have the same professional or educational background, but rather that the space attracts individuals with similar views and affinities. A manager whose space focuses on social entrepreneurship clarifies it:

> *We need a specific focus. If not, what is our work based on? Which collaboration goal can you establish in a place is there is no purpose? [...] It doesn't mean that people have to be necessarily very specialized. For instance, our theme is social impact and it is not a narrow at all. There is social impact in housing, in collaborative economy, in education, in many things. [...] It is not very specialized, it is thematic. (Interview with manager of space L)*

Reasons for specialization might have different origins. In some cases, the will to specialize is related to the associated values, in other cases, to specialize represents a way of having a distinguishing factor in relation with other spaces:

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The other coworking spaces are not competition. If another spaces just next door with better prices with similar services, then it might represent competitors. But other spaces are just different. We are not better or worse, just different. (Interview with manager of space C)

To ensure that all coworkers understand the coworking dynamics in the same way, some managers follow a selection process. For instance:

We have an admission process. The director or I [community manager] do an interview. We act in an organic ways, there is not a script. We explain very well what [our space] is. We spend 60 to 90 minutes to explain what they can expect from us and what we expect from them and the rest of coworkers. Normally, during this process, people that do not fit, decide to leave. This is not a hippy commune, everybody comes to work it their own project but we expect that they help each other. Things emerge in a very natural way but we spend 60 to 90 minutes to explain very well what this is about. (Interview with manager of space C)

In other cases, the selection process is natural, as the newcomers not fitting in the "atmosphere" of the space will tend to leave and go to another space:

People identify themselves with [our space] community. There are people that do not fit and just leave. Many say they are part of [our space]. We knew from the start that the value is in the people, in the community [...] All what we do is to promote our people, events, etc. (Interview with manager of space E)

Spaces focusing on the creation of a highly creative and collaborative community might not be interested in any kind of coworkers, especially coworkers that are looking for a cost-related type of collaboration. A manager stated:

The people that interest us know already what is coworking. They are not a profile caused by the crisis. They are not here because it is cheap. We do not have the profile of people coming because of the crisis. In the first place, if you have that profile, we don't accept you. [...] To be accepted, you have to show us that you are an entrepreneur, that you have an open mind. All these are intangibles, but it's what it counts. You might be 25 or 50 years old. I know the guys that the community will like, and I tell them directly: "You are in". (Interview with manager of space N)

Some other spaces, the specialization has emerged progressively. In some cases, the focus on a certain field has been present since the beginning but has been incrementally implemented, as it is the case of space L where the type of collaboration is also changing together with the increasing importance of the specific focus:

> *They start sharing projects. There are people that are very good at organizing events, others at designing websites, others at branding, others at advertising... Rather than a thematic collaboration around social impact, they are doing a functional collaboration. [...] In the last months, some people get together, even to go and visit a potential customer. So far, it is at this level and not at the level of sharing a supra-cause, a supra-project. (Interview with manager of space L)*

4.5.3.2. Transmitting an inspiring vision

Some of the managers of these coworking spaces that focus on developing highly collaborative communities, envision what they would like their community to become. They transmit passion when describing their vision, as in the case of space E and N.

In the case of space E that focuses on creativity and the maker movement, the manager said:

> *My objective is to make maker-ville. [...] It is a very different vision [than the one from the city hall]. It is like, for instance, in a classroom a teacher gives you a work to do, as a test, and you just do it without excitement, you have to do it, you do it. But if you let the children play with Lego, they come to you with big eyes, with an incredible motivation, that is the difference between makerspaces and something that the city hall does. (Interview with manager of space E)*

In the case of space N, the manager referred to creating a lifestyle or even a religion:

> *The objective is that in ten years, [our coworking space name] is a lifestyle. What I want is that with all of us, we create a religion. Coworking is the social side. It is more than a club. (Interview with manager of space N)*

4.5.3.3. Empowering the community

In the coworking spaces focusing on the development of the collective creativity and

collaboration of the community, the managers empower the community by transmitting their full confidence on the outcomes of collaboration. In this way, community members take ownership of the space and consequently reinforce their feeling of membership and collective identity. As a manager explains:

> *We want to be deliberately always in beta, in constant evolution. We never close it in order to keep people shaping it. In this way, it fosters collaboration and the generation of new things. Things happen here. If you come and everything is very nice, you like it but you don't take ownership. It is like when you go to a fancy hotel, you like it [...] but it is not yours. Here it is just the contrary. You might come to this place and not like it, but there is the possibility for you to change it. Everything here is done by us, the community. There is an identity and this is real. Basically, because we work with a very beautiful and eternal concept: freedom. When you give freedom to people, things happen. This works like a container. Things don't happen otherwise. (Interview with manager of space N)*

Even if spaces are businesses, the community can have access to information that in traditional organizational forms would be limited to managers. For example, in space N, all financial information is available to community members:

> *Another thing that the community likes is transparency. All information about our finances is open and available to all members. Everybody can see how much we spend, in which concepts, etc. [...] All the relevant information is there: incomes forecast, incomes from events... (Interview with manager of space N)*

Managers might guide the collective action of the community but the evolution of the community is completely dependent on itself.

> *What we do is to trust bottom-up rather than top-down processes. [...] Bottom up processes are started without knowing how they are going to end up. You cannot control them, by definition. When we organize workshops and these dynamics, we state very clearly that we can manage the process but not the content. The content is created and is accepted by the ones participating in the process. [...] We designate a representative of the content that is who interacts with the other entities to find common themes and another person takes care of the process, without intervening in the content, to avoid mixing things. (Interview with manager of space L)*

Space managers, beyond organizing activities and events, aim to inspire creativity and provoke collaborative action. To facilitate social interaction, some of them have a coffee shop or bar in the hall. In space E, dedicated to creativity and the maker culture, there is a "fabcafe", where members and visitors can have a coffee while using the 3D printer or the laser cutter. The manager explains the rationale of the fabcafe:

> *In the fabcafe we want to get a laser cutter for people to start getting used to this kind of things. What we offer is access to the machine, access to the people, access to knowledge, to the public. Everything is very horizontal, about sharing and very collaborative. [...] A place like this is necessary, to have a 3D printer to inspire. If somebody comes without knowing what 3D printing is but sees another person working with that, he/she would think: "I can also do a similar thing". It inspires to do things. (Interview with manager of space E)*

In another coworking space, some coworkers decided to organize a challenge together with the management to ignite the community creativity. Coworkers managed to code an app in a week-end just driven by the intrinsic motivation of collaborating with the other members:

> *This app was done by the community in 36 hours. We wanted to do a hackathon in 36 hours [...] The idea was to do something where everybody could participate [...] Two members came to me and asked me: "we want to do a hackathon but not only for developers. Can we do this? ". "Of course, whenever you want". Literally, we [the managers] did nothing. There was nobody from us [our staff]. I came for a while as a member. Most of the members have the keys of the building. I helped to do the video. We just wanted to do something together. [...] It was much more than we could ever imagine. This is coworking, this is coworking. They all are mega talented here and everybody was working together just like this, for the pure pleasure of doing it. It was done in 36 hours and uploaded on the Appstore. A guy calculated that to do that same app in a firm would have taken 5 or 6 months and cost about 100,000 Euros considering the senior expertise involved. (Interview with manager of space N)*

As the above example shows, the collaborative communities that emerge in some coworking spaces represent a source of creativity and innovation that in some cases might be able to outcompete in time, cost and quality developments in traditional organizational structures. A proof of the interest of firms in the collaborative capacity of such communities attracts firms and brands that want to be associated with such community for marketing

reasons, to identify and hire talent, or to propose the community to work with them on an innovative project. Some spaces organize sponsored events, as a manager explains:

> *Where is the business? In the events. [Global German firm] comes and spends 15,000 Euros per event. What does [global German telecoms firm] want? To clean their souls. And they come here. What does [beer company]? When they come to meet us, we tell them: don't give me free beer [...] Give me another thing. This attitude generates another relationship with brands. [...] We don't do collaborations with brands like "Give me your product for free".[...] The deal is "Let's do something together". For instance, with the [beer company], we did an event on the rooftop, but we did it our way. "You are going to benefit from it, but we will not put your logo". A win-win agreement. There are a thousand ways of doing these things. (Interview with manager of space N)*

In spaces promoting highly collaborative communities, the business model is also different from other coworking spaces. The competition is not based on attracting coworkers rather than attracting brands.

> *We do not compete with [space N] for the coworkers, but we compete for the brands. The same brands, big firms, Microsoft, Google, Etsy,... there is a handful at a global level and we all want them. In theory, we have to collaborate in everything. Actually, we collaborate more with [space N partners] in Berlin that with [Space N] in Barcelona. (Interview with manager of space E)*

In this sense, having a collaborative community is not the goal but the aim to be innovative.

> *The community, the community. I have analyzed it a lot. We have stopped participating in talks about coworking, because I am tired of hearing about the community. Obviously it is the community. The secret, the key point, it is the community. But it is not to have a cool community. It is all that is surrounding the community that makes the community to be cool. It is not because the smartest guys are here and the best things happen. No. The [space management] team is very important. We are 5 staff members here, with an event manager. In Berlin, they are 18. (Interview with manager of space N)*

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4.6. The interrelation between spaces and collaboration approaches

Our study on inter-organizational collaboration demonstrates that there are different approaches to collaboration. In our research, we have identified three distinguished collaboration logics.

In this section, we discuss how these three collaboration approaches imply three types of coworking spaces, with distinctive collaborative practices and strategies. Table 6 represents the different coworking spaces included in this research according to the different collaboration approaches.

	Cost-related collaboration	Resource-based collaboration	Relational collaboration
Studied coworking spaces codes	D, I, J, K, and M	A, B, C, F, G, H, P, Q, R, S, and U	E, L, N , T, and V
Physical spaces dimensions	Small-sized spaces (70 – 200 m^2)	Medium-sized spaces (150 – 400 m^2)	Large spaces (>1000 m^2)
Specific assets	Access to privileged location or specific assets	Specific assets (specialization)	Possibility of specific assets (i.e. makerspaces)
Space description	Office with tables and chairs	Mainly office space with some multi-use space (for meetings and training)	Open space. Large multi-use spaces (for events). Also office spaces.
Community size	Small communities (5-15 members)	Medium communities (50-60 members)	Large communities (100-150 members)

Table 6. The spatial dimension of collaboration in the different coworking spaces

In the case of cost-related collaboration, agents collaborate driven by self-interest, searching to reduce their operational costs or the transaction costs of collaboration. In the resource-bases collaboration approach, agents focus on integrating new resources in order to learn or combine them. In the relational collaboration approach, the focus is not on the resources that individual agents share in the collaborative practices, nor the sum of the resources of all collaborating agents. In the relational approach, collaboration is rather

based on the synergistic effect of collaboration. In this case, the locus of innovation is the community and not the individuals collaborating.

The three collaboration logics have been identified in the different practices in the coworking spaces in Barcelona. The three logics can be differentiated but can however take place simultaneously in a same coworking space. Nevertheless, each logic is based on different premises and assumptions, and the combination of different logics in a same space might lead to an inconsistent collaborative atmosphere. For instance, in the case of space N, their focus on relational collaboration caused that potential coworkers looking exclusively for a low-cost coworking space were not interested in joining that community. In the case of space L, they were experiencing a transition from cost-related collaboration to relational collaboration. In this case, the former help them to attract coworkers in a short time interested by the central location and the later was intentionally implemented by the management to progressively focus their activities on social economy.

These two examples illustrate an important point: independently of the collaboration type that a coworking space is interested in implementing, its success depends not only on the will and strategy of the management team but also (and more importantly) on the will and actions of the members of the coworking space. As we have shown in our study, members that will not feel comfortable working in a coworking space, will generally leave to go and check other spaces until they find a space that fulfill their needs (and it is aligned in their collaboration approach). In the same way, managers of some coworking spaces follow a selection process to ensure that all members agree in their collaboration approach. Either in an organic or in an intentional manner, each space will tend to converge in a type of collaboration. This convergence is not only conceptual and cognitive based on shared values and beliefs but has also a direct effect on the practices and on the physical space itself.

In relation with the collaborative practices, the implementation of a cost-based collaboration approach will tend to optimize the costs for the agents that are collaborating. In this kind of spaces, few events, courses or activities are organized. Managers tend to manage exclusively the daily operations of the space, and do not engage in community building or dynamization. In opposition, managers of coworking spaces centered in

implementing a resource-based type of collaboration, facilitate collaboration by engaging in community building. They organize internal meetings and events open to the general public, detecting their members' needs and coaching them, looking for complementarities among members, organizing courses and social activities, etc. In addition to these kinds of activities, in relational collaboration spaces, the community engages in collaborative activities like developing projects, innovative challenges or competitions. The management of such spaces empowers the community to freely self-organize, providing the support to the collective development.

Concerning the physical space, the three kind of spaces also differ. Spaces focusing on cost-related collaboration, tend to be in central locations or of strategic interest for specialized companies. Having access to a privileged location at a lower cost incites collaboration in this case. The dimensions of the space tend to be small according to our observations, being standard-size offices or flats relatively common. Spaces focusing on resource-based collaboration underline the professionalism of their services to members and tend to take special care of the design and aspect of their offices. An attractive branding, good quality furniture and professional-looking wide offices are common in this type of coworking spaces. Spaces focusing in relational collaboration tend to be much larger than the previous two types. These spaces are based on a constant flow of people, doing different activities in different parts of the space. For instance, spaces E, N, and V have bars on the ground floor where coworkers mix with visitors. Both spaces E and N combine large rooms for standard coworking (with tables and chairs) and large spaces used as makerspaces of at least 500 m^2. On average this kind of spaces are about 1500-2000 m^2. According to a manager, the reason is that they need to be able to do several different kinds of activities simultaneously: coworking, working in the makerspace, relaxing in chill-out zones, participating to events, courses, meetings, etc. In space N, a whole floor has even been transformed as a dormitory, where coworkers can take a nap during a team work marathon.

4.7. Discussion

Table 7 summarizes our arguments.

In cost-related collaboration, agents are motivated to cooperate to reduce two types of costs. Firstly, by sharing operational costs and secondly, by reducing the transaction costs by sharing specific assets. Regarding operational costs, agents might be pushed to collaborate to reduce their overall operational costs like, for instance, electricity bills, commodities, office rent, etc. Situations of financial crisis, lack of funding (i.e. new startups) or budget reductions might be at the origin of this kind of collaboration. Regarding transaction costs, collaboration allow agents to reduce the transaction costs related to the three asset specificity identified by Williamson (1985): (1) site specificity, (2) physical asset specificity, and (3) human asset specific. First, on the one hand, agents collaborate to have access to a privileged location (i.e. an expensive office in the city center). On the other hand, the physical proximity facilitates face-to-face interaction and collaboration. Second, agents needing specific (expensive) physical assets, like specialized machinery or tools, might be motivated to collaborate to reduce not only the operational costs but also the related transaction costs. Dyer (1997) empirically found that agents that collaborate and invest in specific assets reduce their transaction costs. Third, in this case where agents collaborate to specialize, human co-specialization will also reduce the transaction costs as communication will be facilitated. In short, by sharing a space and assets, agents reduce the transaction costs linked to search for information, contracting, monitoring, and enforcement (Hennart, 1993; North, 1990; Williamson, 1985).

	Cost-related collaboration	Resource-based collaboration	Relational collaboration
Theoretical approach	Transaction cost economics	Knowledge-based view, resource-based view	Relational view
STRUCTURAL DIMENSION			
Network focus	Space internal network	Internal and external network	Internal and external network
Network size	Small networks	Medium networks	Large networks
Network ties	Dyadic social ties, social daily interaction	Social and professional ties. Some strong dyadic ties and within cliques.	Multiple weak ties in distributed network
COGNITIVE DIMENSION			
Specialization	No specialization or specialization around specific physical assets	Narrow specialization (i.e. communication, web design, photography, architecture, etc.)	Broad specialization (i.e. social innovation, creativity, innovation, etc.)
Shared goals	No collectively shared goals; each member works on his/her own projects	No collectively shared goals. Members collaborate in projects to accomplish their own personal goals	Collectively shared goals, although members also work on their personal goals.
Shared culture	No shared culture	Weak shared culture	Strong shared culture
Relational Trust	Dyadic trust	Dyadic trust and trust developed in small groups	Collective shared trust
SUPPORT AND COLLABORATION ACTIVITIES			
Collaborative focus	Absence	Exploitation. Coordinate and integrate existing knowledge	Exploration. Create new knowledge
Knowledge sharing activities	Absence of activities	Internal (training, coaching, community building) and external (events)	Internal (competitions, collective projects) and external (events)
Individual support	Provided by informal social interaction. No specific action from managers.	Managers actively coach and support members. Internal community activities.	Provided collectively by the community. Managers support members collectively rather than individually.
Type of collaboration	Some dyadic functional collaboration.	Dyadic and small group collaboration	Intensive collaboration at the community level
Management approach	No specific action. Ensure a good social and working atmosphere	Support individually the members. Foster collaboration and community building.	Support, empower, motivate, inspire, provoke and challenge the community
Members approach	Focus on own projects. Few collaboration.	Collaborate to reach individual goals	Collaborate to reach collective and individual goals.

Table 7. Characteristics of the different types of collaborative approaches in coworking spaces

In resource-based collaboration, agents are motivated to collaborate to engage in knowledge sharing. Motives can be to 1) learn and improve their own skills, capabilities and resources, or 2) with the aim of collaborating to have access to complementary resources that they lack. The first approach related to the learning perspective on the resource-based approach (Inkpen & Crossan, 1995; Kale et al., 2000; Larsson et al., 1998; Mowery et al., 1998; Simonin, 1997) and the second to the resource-access approach (Grant & Baden-Fuller, 1995, 2004). These two reasons imply different kinds of activities: learning activities can mean participation in training courses, or getting professional coaching services. Searching, identifying and combining external resources might push agents to engage in activities such as networking, participating to social events or contracting services to search for agents with complementary resources. In both cases agents require "absorptive capacity" (Cohen & Levinthal, 1990) and a cognitive proximity with the other agents. Environments facilitating different kinds of proximity among the agents (Boschma, 2005), like for instance, ensuring a certain common interest, values, or professional specialty, will facilitate collaboration.

In relational collaboration, agents are motivated by the exploration rather than exploitation (March, 1991). They are not driven by extrinsic but intrinsic motivation. They engage in collaborative practices in order to create new knowledge and gain new resources. Collaboration do not respond to a previously established strategy of gaining a specific knowledge or resource that they lack, as the explorative character of collaboration leaves the door open to unexpectedness and improvisation. Agents are embedded in the network and identify with the community, to the point to focus more in the success of the collective endeavor rather than in tracking if their degree of contribution was balanced relatively to the other network members or if their contribution would represent knowledge spillovers that potential free riders could take advantage from.

The three collaborative approaches presented in this article represent different degrees of collaboration regarding different aspects as the implication of agents, trust among agents, and complexity of the relationships. First, cost-related collaboration requires a low

investment on social capital, inter-organizational trust, or cognitive proximity to start participating. The organization, structure, and coordination of this type of collaboration do not require strong involvement or even the existence of an agent managing the activities. Second, beyond sharing assets to reduce costs, to engage in a resource-based type of collaboration, agents need to previously get to know the resources they need to complement their own, and to scan the available resources in the collaborative network. In this case, the collaborative activities will greatly benefit from the intervention of an agent dedicated to the process of community building and management that helps agents to identify potential partners with complementary resources. Third, to share assets and costs, learning from others, or having access to external resources i snot enough to reach a relational type of collaboration. In this case, agents need to have a cognitive proximity, and the required absorptive capacity to profit from the collective activities.

As we have shown, resource-based collaboration provides ways of integrating different resources and knowledge bases. However, there is a need of "architectural knowledge" (Henderson & Clark, 1990) to be able to successfully integrate diverse knowledge bases. This common knowledge would be also required in the case of relational collaboration to implement complex collaborative endeavors composed of a combination of diverse knowledge bases (Brusoni, Prencipe, & Pavitt, 2001; Brusoni & Prencipe, 2001).

Our results show that the three approaches can be applied progressively even if each of them requires different type of implementation. In some cases, the three approaches can be complementary and reinforce each other. For instance, a community might emerge initially motivated by sharing specific assets, in a second step, physical proximity and frequent face-to-face interaction might lead to and evolve in a synergistic and explorative relational collaboration.

4.8. Limitations and further research

An important limitation of our study is related to what Yin refers as analytic generalization (Yin, 1984). Other conditions might affect the motivation to collaborate practices among coworkers and the collaborative practices that managers implement. Therefore additional research should conduct more case studies in other contexts to determine if the analytic generalization of these results might be strengthened.

Our study has focused on coworking practices in the city of Barcelona. The current context of the research has been dependent on the current economic conditions of Spain in general and Barcelona in particular. The economic crisis has directly affected the emergence of the coworking effect. It is beyond the analysis of this research to determine to which extend has the economic and social context affected the collaborative practices. Consequently, to generalizability of the current collaborative practices to other geographic and socio-economic contexts in uncertain.

Our study has underlined the important role of managers in the collaborative processes. However, further research would be needed to study the governance aspect of coworking structures. As research has shown, a governance structure that minimizes transaction costs would thereby enhance efficiency (North, 1990; Williamson, 1985). Informal forms of control like social trust are most effective and less costly than formal controls in complex collaborations (Granovetter, 1985; Macaulay, 1963; Uzzi, 1997). Thus, self-enforcing safeguards result in lower transaction costs and in more effective collaborative endeavors. Our results suggest that aligning the types of inter-organizational transactions with the structures facilitate collaboration, confirming previous studies (Dyer & Singh, 1998). Thus further research is needed in order to deepen on the influence of governance structures in coworking spaces.

The three collaborative approaches described in this article have been described try to underline the unique characteristics of each one and the differences between them. However, the three approaches have common traits and overlaps that difficult a clear cut

between types of collaboration. For instance, cognitive proximity, as we have shown, is crucial in resource-based on relational collaboration. However, it is also necessary in the case of cost-related collaboration to ensure a long-lasting good work environment in a cost-transaction collaboration approach. Similarly, cost-reduction is not an exclusive characteristic of a cost-related collaboration approach. For instance, coworking spaces focusing on relational collaboration also follow an aggressive campaign to offer low costs to attract coworkers. And coworkers might be influenced by price in all cases. However, in the case of cost-related collaboration, the focus on overall cost reduction is the main (or even the only) motivation to collaborate.

Finally, another limitation of our study derives from the level of the analysis. Innovation is composed of intertwined processes at different scales (Bunnell & Coe, 2001). Coworkers are individuals that interact among them in the personal sphere but that at the same time are representatives of their professional status or their (micro)-firm. In the case of coworking, the social and professional aspects of coworkers are intimately related. In other words, interaction of coworkers as individuals that engage in social interaction is difficult to disentangle from the interaction of the economic agent that each coworker embodies when collaborating. This fact confirms the importance of the social capital and social interaction of collaboration (Inkpen & Tsang, 2005). Our research has focused on the inter-organizational collaborative approaches. However, the generalization of our results to other organizational contexts with a minor degree of social interaction might be limited. Nevertheless, our results show the importance of the face-to-face interaction and the co-location in order to nurture successful collaborative relationships.

4.9. Conclusion

This article studies the inter-organizational collaboration in coworking spaces. In this localized spaces, entrepreneurs, expatriates, freelancers and other self-employed professionals work and interact. Co-location and frequent and constant face-to-face interactions facilitate collaboration. We have identified three different approaches to collaboration: 1) cost-related collaboration, 2) resource-based collaboration, and 3) relational collaboration. Our results lead us to the some important contributions to the literature on inter-organizational collaboration. First, each coworking space tends to focus on one kind of collaboration type, even if the other types of collaboration can take a minor role. Second, the order of the approaches corresponds to an incremental engagement of actors involved and the complexity of the collaboration. Cost-related collaboration can be based in mere contractual transactions while a relational collaboration requires a fertile soil of social trust, intense engagement from all agents driven by a strong (intrinsic) motivation. Third, the type of collaboration is related with the characteristics of the physical space where the collaboration takes place (surface, distribution, etc.). The type of collaboration follows the space characteristic (i.e. an exclusive central location leads to cost-related collaboration) and *viceversa* (i.e. relational collaboration needs large spaces were diverse simultaneous activities take place). Fourth, the type of collaboration implemented depends on the purpose of both the coworking space managers and the community. Fifth, a collaborative community might emerge (or not) depending, in part, on the (different types of) proximity among coworkers. Focusing around a specialization or theme while maintaining diversity in the approaches strengthens the identification with the community. Specialization might be a result of a purposeful selection of coworkers or a consequence of the natural selection through the flow of coworkers. Sixth, coworking spaces managers have a leading role in the implementation of the collaborative approach, by organizing collaborative activities (social events, coaching, training, etc.) and empowering the community to freely evolve. Despite the crucial influence of space managers, only the active engagement of coworkers can ensure a fruitful collaboration.

These results contribute to the literature on inter-organizational collaboration by offering

some clues about how the physical environment and the action of the space and community managers can influence positively the collaborative practices among economic actors.

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Conclusion

This thesis represents a contribution to the understanding of how urban innovation communities participate in the knowledge and innovation dynamics at different levels.

First, at the global level, communities that emerge in localized spaces of collective innovation facilitate the knowledge sharing and the diffusion of innovations at a global level. The members of coworking spaces, maker spaces, hacker spaces, Fab Labs or Living Labs, not only belong to a local community of innovators but also are part of larger global innovative trends like the coworking movement, the maker / hacker movement, or the Fab Lab movement. The cognitive proximity among members of distant but similar communities might play a more important role than geographic proximity in the knowledge and innovation processes. The global dynamics between communities contribute to the creation of "global pipelines" (Maskell 2014; Maskell et al. 2006; Bathelt et al. 2004; Morrison et al. 2013) and in parallel, allow external ideas, knowledge and innovations from external sources to be integrated in the local ecosystem f innovation, thus feeding the "local buzz" (Storper & Venables 2004; Asheim et al. 2007; Currid & Williams 2009; Bathelt et al. 2004).

Second, at the local level of the city or district, localized innovation communities act as actors of the "middleground" by facilitating the interaction between creative individuals of the "underground" with the formal organizations of the "upperground" (Cohendet et al. 2010). The empirical research of the dynamics of innovation in the coworking spaces of Barcelona shows how innovation processes are articulated through places, spaces, projects and events (Grandadam et al. 2012). These mechanisms allow the insiders of the localized innovation communities to interact with external local actors (firms, other communities, public institutions, neighbors and citizens). These dynamics nurture both the internal innovation activities of the community and the local diffusion of the results of the exploration.

Third, the findings also show the different internal dynamics of localized innovation communities. Through a comparison of the different collaborative practices inside different coworking spaces located in Barcelona, the research provides evidence that each space tends to put in place a specific approach on inter-organizational collaboration. Three differ-

ent approaches can be distinguished: 1) cost-related collaboration (Williamson 1985; Silverman et al. 1997; Klein et al. 1978; Teece 1987; Dyer 1997), 2) resource-based collaboration (Zajac & Olsen 1993; Eisenhardt & Schoonhoven 1996; van de Ven & Walker 1984; Inkpen & Crossan 1995; March & Simon 1958; Grant 1996a; Kogut & Zander 1992; Nelson & Winter 1982; Lave & Wenger 1991; Grant & Baden-Fuller 2004), and 3) relational collaboration (Dyer & Singh 1998; Borgatti & Cross 2003; Inkpen & Tsang 2005; Barney 1991; Barney 1986).

The research represents a contribution at the empirical, theoretical and methodological levels.

At the empirical level, this research sheds light on some of the new global movements that are increasingly expanding around the world. The explosion of coworking spaces, Fab Labs, Living Labs, hacker / maker spaces and other kind of labs has highlighted the current trends of emergent communities focusing on knowledge creation and innovation. Despite the growing impact of these communities in localized processes and in organizational structures centered on innovation, little research has focused on their study. This research contributes to better understand the knowledge dynamics within these communities.

At the theoretical level, the research aims to contribute to different fields. Regarding the knowledge-based view in economic geography (Howells 2012; Howells 2002; Gertler 2003; Gertler 1995; Kogut & Almeida 1999; Morgan 2004), the thesis complements the research on the geography of knowledge and innovation and more precisely in the understanding of the knowledge and innovation dynamics in cities (Bathelt & Cohendet 2014; Cohendet et al. 2009; Cohendet et al. 2010; Florida 2002). To the knowledge management and knowledge-view theories of management (Grant & Baden-Fuller 1995; Grant 1996b), the research explores firstly the notion of knowing community (Amin & Roberts 2008; Boland & Tenkasi 1995; Cohendet 2005), and secondly the knowledge dynamics involved in collaborative practices. Considering that knowledge is intrinsically an individual-based phenomenon, my research on knowledge dynamics take into account different scales (Bunnell & Coe 2001), offering opportunities to contribute to the research on intra- and interorganizational levels.

Finally, methodologically, the structure of the thesis in three complementary sub-projects helps to uncover the intimately intertwined levels of the knowledge dynamics, taking in consideration the global, local and internal contexts of localized innovation communities. Nevertheless, the results of this thesis present some limitations.

Although several data sources have been collected to ensure the triangulation of data, the question about the generalizability of the results remains open. This is related to the qualitative character of the chosen methodology; however, in our particular case this limitation is especially relevant. First, at the global level, the study has considered only the processes taking place in Barcelona, without analyzing the effects of the global interaction of the community insiders on other cities. Second, we have focused mainly on the study of space managers and community managers. Interviewing a larger sample of members would have helped to understand the actual practices. Third, due to the particularities of coworking spaces in comparison to other organizational structures, the different types of inter-organizational collaboration that have been identified might not apply to other types of organizations or even other localized communities.

Dealing with different scales and levels of analysis (individuals, communities, organizations) present methodological and theoretical challenges. One of the most salient is the double character of members of coworking spaces, on the one hand, as individuals interacting in social environment, and on the other hand, as representatives of their (unipersonal) firm. This dual role questions if inter-personal collaboration can be interpreted as inter-organizational collaboration.

Finally, at the methodological level, the main source of data has been open-ended interviews. Time limitations have forced to reduce the time allowed to observation. More observation from an ethnographic point of view and a focus on practices would have provided a closer look on the current innovative and collaborative practices that were taking place in the spaces. Interviews risk to provide a biased and interpretative vision on such activities. A longitudinal study would have also provided a better understanding on the emergence and evolution of processes in time.

New phenomena like the coworking or the maker movements have aroused much interest from innovation practitioners and policy makers. The increasing importance of the Living

Lab movement is a clear indicator that policy makers and public institutions are looking for new ways of engaging citizens in processes of innovation and knowledge creation. Nevertheless, little research has been done about such localized spaces of collective innovation. Research on Living Labs has started to develop mainly by the impulse of the ENOLL (European Network of Living Labs) but curiously enough, little works have focused on the dynamics in Fab Labs, considering they are based on an initiative of the MIT, one of the most important research institutions in the world. Given the practical implications that these spaces generate for open innovation processes, further research on the understanding of these phenomena would be welcome.

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