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Local-Global knowledge sourcing in the context of an open innovation knowledge platform: the case of Amsterdam Denim City

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Abstract

Our paper investigates the inherent tensions between the *local* embeddedness of highly tacit knowledge and the *global* sourcing of 'open' knowledge or innovation. A single case study design enabled us to perform a thorough and detailed analysis of inter-firm collaboration and open innovation within the specific context of the Amsterdam denim cluster, which is internationally renowned as a centre of denim expertise with an important focus on sustainability. In-depth interviews and workshops were held with several stakeholders involved in Denim City, such as campus managers and denim brands. We find that open search strategies have more depth than breadth when the collaboration is focused on radical innovation. We also shed light on the complex relation between appropriability and openness when collaboration involves competing firms. We also show that cognitive proximity of partners plays a role in the global sourcing of knowledge.

Keywords

- Open innovation, global-local knowledge sourcing, proximity

Introduction

For a variety of reasons, firms are increasingly collaborating with multiple stakeholders and sourcing knowledge, expertise and capabilities across international borders. Prior work in the innovation systems literature shows that the clustering of knowledge resources is locally embedded in various actors and institutions and that geographic proximity aids the transfer of highly tacit, sticky, locally-embedded knowledge that does not travel easily across borders (Gertler, 2003). Accordingly, cities and metropolitan regions develop specialized (technical) knowledge and expertise in industry clusters or ecosystems that function as anchors attracting talent and businesses, driving innovation and economic development (Edquist, 1997; Florida, Gulden and Mellander, 2008; Nelson, 1993). The aim of this research is to explore the inherent tensions between the *local* embeddedness of highly tacit knowledge and the *global* sourcing of 'open' knowledge or innovation.

To study the interaction between local and global knowledge sourcing, we focus on the empirical context of the Dutch apparel/textile industry. Since the 1990s, the manufacturing of clothing and textiles in the Netherlands has been increasingly, if not completely, offshored, making it essential for Dutch apparel firms to engage in international relations with suppliers. At the same time, locally based non-governmental organizations arose to protect the social rights of workers and ecological interests. The technological specializations in apparel (especially denim) and sustainability in the Amsterdam Metropolitan Region have evolved and a strong clustering of local knowledge, expertise and capabilities that link global apparel and denim manufacturing and social and ecological sustainability has emerged.

We focus on a particular open innovation platform in Amsterdam: Denim City. Denim City is an innovation campus, bringing together denim stakeholders to make the industry "cleaner, dryer and smarter". A single case study design enabled us to perform a thorough and detailed analysis of inter-firm collaboration and open innovation within the specific context of the Amsterdam denim cluster, which is internationally renowned as a centre of denim expertise

with an important focus on sustainability. In-depth interviews and workshops were held with several stakeholders involved in Denim City, such as campus managers and denim brands.

We make several observations from our findings. First, we see that open search strategies for knowledge sourcing were narrow in scope, drawing on few sources of technical and market knowledge and especially on sources that were cognitively and geographically close. However, although the breadth of external knowledge sources was limited, the intensity of knowledge exchange with these sources was deep, suggesting that open innovation collaborations focused on radical innovation draw on depth in their open search strategies. Secondly, our findings also shed light on the complex relation between appropriability, openness and competitor firms and suggest that, by including competitor firms in collaborations, there are compromises in collaboration on either the ability to appropriate value or the ability to be open. Lastly, when knowledge sourcing extended beyond a local context, global knowledge sourcing was influenced by the cognitive proximity of sources.

The paper is structured as follows. In the next section, we present the theoretical background. Following that we discuss the research design and methodology. Then the findings are explained and the implications of the findings are discussed.

Theoretical background

Innovation systems, knowledge and learning

Knowledge and learning is an essential component of innovation systems often leading to the creation and exploitation of unique competences and resources that create competitive advantage for the actors in the system and the region or nation more generally (Lundvall and Johnson, 1994). Many scholars have focused on explaining and investigating the comparative advantage of national systems (Hall and Soskice, 2001; Lundvall, 1992; Whitley, 1999) and the competitive advantage that these systems afford to nations and regions (Asheim and Coenen, 2005; Porter, 1990). Innovation systems consist of diverse actors, e.g. firms, universities, governments, and the formal and informal institutions that govern the behaviour and interaction of the actors. The knowledge and networks of the actors in urban, regional and national systems shape the innovation processes of firms (Asheim and Coenen, 2005, Asheim and Isaksen, 2002; Hall and Soskice, 2001; Whitley, 2007).

The potential for a firm to convert knowledge to learning that is used for innovation will depend greatly on who inside and outside the organization is participating in the process of knowledge creation and how that process is taking place (Nonaka et al, 2000). Creating and exploiting knowledge, however, requires transforming tacit and codified knowledge from external sources to internal sources and integrating this knowledge into new or existing organizational routines (Nelson and Winter, 1982; Nonaka, 1994). This relationship and interplay between tacit and codified knowledge acquisition, transfer and integration is complex. The prevailing view is that tacit knowledge is difficult to transfer across borders and is more embedded in local networks and innovation systems.

There is an on-going debate in the literature regarding proximity (geographic, cognitive, social and institutional) and the creation and exploitation of knowledge, especially tacit knowledge. On one side, scholars argue that learning and knowledge is embedded in specific people and machines in contexts of local production (Asheim and Isaksen, 2002; Gertler, 2003; Heimeriks and Boschma, 2014; Maskell and Malmberg, 1999) and that close proximity

between actors and organizations facilitates the creation, acquisition, accumulation and utilisation of knowledge (D'Este, Guy and Iammarino, 2012). This exchange is rooted in the inter-organizational networks of the regional or local innovation system (Kauffeld-Monz and Fritsch, 2013). Firms are able to take advantage of the sticky, embedded knowledge grounded in the social interaction of the local actors. In a study on three Norwegian clusters of different industries, Asheim and Isaksen (2002) show that the local proximity of knowledge sourcing and the contextual tacit and codified knowledge are 'geographically immobile'.

Yet, other scholars counter this view questioning whether specific innovation and production processes are typically associated with regional or local innovation systems only (Bathelt, 2005). Cooke (2004) takes a broader view of the regional innovation system and defines this not only as actors interacting to generate and exploit knowledge but also as "subsystems linked to global, national and other regional systems (Cooke, 2004, p. 3). In an increasingly globalized world, linkages in regional or local innovation systems quite realistically extend beyond national borders to international or global knowledge bases.

Thus, scholars increasingly take the stance that local and global knowledge sourcing practices and economic development are interlinked (Bathelt and Cohendet, 2014; Presutti, Boari and Majocchi, 2013). Regional and local economic systems are not isolated environments and economic growth and development is stimulated by impulses from outside of the system. Firms, and other actors, within an innovation system cannot depend solely on local knowledge flows and are engaged in accessing knowledge that is considerably distant. These global-local knowledge flows draw on knowledge from different localities, regions and countries, forming 'cross-national feedback loops' and are perhaps more translocal, transregional or transnational than purely global (Bathelt and Cohendet, 2014). There is a growing consensus in the literature that accessing knowledge from primarily local sources is incomplete and firms are increasingly creating structures and mechanisms by which to source global knowledge sources (Maskell, 2014).

This dynamic between local and global knowledge sourcing, creation and exploitation raises questions about the role of proximity. Extant work in the economic geography literature highlights the benefits of geographic proximity in processes of learning, knowledge creation and diffusion and innovation (Feldman and Audretsch, 1999; Almeida and Kogut, 1999). Research, however, in the area of global-local knowledge access is lacking. A recent special issue of the *Journal of Economic Geography*, focusing on global-local knowledge access and creation, highlights two perspectives from the extant research (Bathelt and Cohendet, 2014). First, there is a focus on understanding the global-local knowledge creation processes in eco or innovation systems and, secondly on local and global knowledge exchange through 'pipelines' or networks that link to distant knowledge 'providers', for example through value chain networks or temporary organizations (Coe et al, 2008; Maskell, Bathelt and Malmberg, 2006; Owen-Smith and Powell, 2004). Knowledge exchange and learning that takes place in temporary organizations, such as projects or platforms (Asheim, 2002; Grabher, 2002; Gann and Salter, 2000), challenges the prevailing conceptual views of local and regional innovation systems as evidenced by the increasing attention scholars are showing in external knowledge sourcing from international and open sources (Bogers and West, 2012; Chesbrough, 2003; Laursen and Salter, 2006; von Hippel, 2005).

External sources of knowledge, open innovation

Open models of innovation have changed the way firms search for new ideas and fill research and development pipelines (Chesbrough, 2003; Laursen and Salter, 2006). Accessing knowledge using open search strategies involves a wide range of locally and globally dispersed external actors. Technological advances in communication have dramatically changed how firms access knowledge and learn (Maskell, 2014), aiding the creation of ties to transfer knowledge regardless of physical proximity (Amin and Cohendet, 2005).

In a study from Laursen and Salter (2006), they find empirically that 'open search strategies', or searching widely and deeply, has an inverted U-shape relation to innovative performance. The more that firms search widely, or draw on an extensive number of different knowledge sources, and deeply, drawing intensively on knowledge from those different sources, the greater their innovative performance. However, there is a point of diminishing returns since extensive open search has associated costs to the firm (Koput, 1997) and may be limited by internal absorptive capacity to filter and evaluate new ideas (Cohen and Levinthal, 1990), limited managerial attention (Ocasio, 1997) and misalignment in timing ('wrong time, wrong place'). The ability to exploit external knowledge is crucial to innovative performance; yet it is difficult for firms to know, prior to engaging in knowledge exchanges, whether the knowledge is valuable. There are considerable information asymmetries and uncertainty in open search strategies for knowledge. Moreover, in a replication study on Swiss firms by Garriga et al (2013), they find that both the breadth and depth of knowledge sources are statistically significant for incremental innovative performance but not for radical innovation and they highlight the importance of the institutional context in studying open innovation.

As innovation processes are becoming more open, distributed and democratic (von Hippel, 1988, 2005; Chesbrough, 2003; Coombs et al, 2003; Chesbrough, Vanhaverbeke and West, 2006), there is a burgeoning debate among scholars about the level of openness. On the one hand, the creation of ideas and exchange of knowledge requires openness and on the other, the exploitation of ideas and commercialization of inventions requires intellectual property protection – the 'paradox of openness' (Laursen and Salter, 2014). Appropriating value from new ideas or inventions requires managerial attention, effort and resources to file and manage patents, guard secrecy and secure access to complementary assets (Arora et al, 2001; Teece 1986, 2002). Laursen and Salter (2014) find that high levels of appropriability are associated with decreasing levels of openness, but the direction of causality is unclear. Firms that are highly protective place limits on open search strategies and may miss opportunities. Yet it is also argued that intellectual property protection enables openness with external (knowledge) partners by reducing managerial fears of opportunistic behaviour (Chesbrough et al, 2006; Teece, 2002).

Knowledge sourcing and learning in creative industries

From the above discussion on recent literature, it is apparent that local and global knowledge sourcing processes, open search strategies and innovative performance are intrinsically linked. This is especially the case in creative industries, which have strong links to the local or metropolitan environment (Florida, Gulden and Mellander, 2008). These industries – that include diverse industries such as advertising, design, fashion, film, music, software, to name a few – are fundamental to the new 'creative economy' (Cooke and Lazzereti, 2008). Knowledge in these industries, being highly tacit and embedded in idiosyncratic individuals, manifests in highly localized contexts.

There is need to reframe local innovation systems of creativity differently. Many of the firms in creative industries are small, individualistic firms, and generally have informal R&D or creative processes, lacking research laboratories or R&D subsidiaries. Intellectual property is protected primarily by secrecy and hinders open search strategies and participation in international R&D partnerships or alliances. Locally, creative industries have strong communities of practice, or networks, which are firmly rooted in the local context or the 'soil of the creative city' (Cohendet and Simon, 2007; Crevoisier and Jeannerat, 2009).

Creative industries are thus inconsistent with the theorizing in the literature on local and global knowledge sourcing. This raises questions about how firms in creative industries achieve high innovative and economic performance. Bathelt and Cohendet (2014) identify three areas of potential future research focusing on: 1) creative agents and the local creative process, 2) community formation and exploitation of creative ideas and, 3) temporary formal and informal organizational forms, such as 'translocal knowledge platforms'. Our study addresses this call for research as we investigate the facilitation of local-global knowledge exchange through an open innovation knowledge platform.

These kinds of translocal platforms play an essential role in knowledge creation and exchange in creative cities by facilitating processes to connect talented individuals and bridging geographic, cognitive, social and institutional distance. These platforms or intermediary groups, also called the 'middleground', are the linking pin between the 'underground' of creative individuals (Florida, 2008) and the 'upperground' of established industry players. These temporary or permanent knowledge platforms, which manifest as communities of practice or networks, operate in chaotic and unpredictable ways (Bathelt and Gibson, 2013) and are vital for the breeding of new ideas and innovation.

Although prior work has investigated open innovation and knowledge exchange of virtual communities and environments (Bogers and West, 2012; Dahlander and Magnusson, 2008), few scholars have turned attention to creative processes of communities in physical space and the local-global knowledge flows. Translocal knowledge platforms or spaces take a variety of forms, from highly experimental 'hacker spaces' that often do not have economic motivation (Bathelt and Cohendet, 2014), to co-designing co-creating laboratories that are highly organized initiatives fostering collective goals and creating solutions for collective (commercial) problems and to, lastly, more general public 'open-spaces', co-working spaces where individual agents or citizens engage in knowledge sharing and exchange (Bilgram, Brem and Voigt, 2008).

The extant literature has paid little attention to understanding how knowledge access and exchange occurs (Stewart and Hyysalo, 2008) between actors engaged in creative industries translocal knowledge platforms. It is important to uncover the mechanisms that underpin the creative process in translocal knowledge platforms, which are essential to the dynamic growth and development of creative industries and creative cities. Our study looks specifically at the knowledge exchange of an open innovation knowledge platform and its associated group of actors. We aim to explore the inherent tensions between the local embeddedness of highly tacit knowledge and the global sourcing of 'open' knowledge and innovation. We ask the question: How do local and global actors access new knowledge and manage knowledge exchange in an informal and open knowledge platform?

Research design

We use a qualitative, single-case study to address our research question. A case study design is appropriate because we aim to explain how a phenomenon unfolds in a real-life context rather than reveal a relationship between variables (Yin, 2003). Our aim is to understand how local and global actors engage and interact to access and exchange knowledge and, as such, we are concerned with uncovering underlying mechanisms of behaviour (Langley, 1999). Using a case study method, we gain deep insights into the actors and the contexts in which they operate. Our approach is based on an inductive inquiry of a holistic, single-case study. The case can be seen as a revelatory and typical case (Yin 2003) and the setting reflects a real-world, real-time situation.

Research context

To study the interaction between local and global knowledge sourcing and exchange, we selected a revelatory and typical case of an open innovation knowledge platform embedded in the Amsterdam denim industry, a sub-segment of the apparel/textile industry, called Denim City. Denim City is an innovation campus, bringing together denim stakeholders to make the industry "cleaner, dryer and smarter". Denim City encompasses different areas of focus: the Jeans School for trade education, the Denim Institute for specific research in denim industry, the Blue Lab for collaborative testing of new technologies and the Denim Embassy for networking and facilitating of the knowledge platform. Denim City is a central intermediary actor at the heart of the denim industry, bringing together denim stakeholders to innovate collaboratively and triggering substantial change in denim industry practices. Although locally embedded within the emerging Amsterdam denim cluster, their focus and reach is much more global in scale: linking a plethora of national and international denim stakeholders, from Amsterdam based denim brands to mills and producers in Europe and beyond.

The specific context of Amsterdam is representative of creative cities and the creative industries sector is important for regional and national economic growth. The city's policy and 2020 ambition is to have the creative industries act as an 'innovation motor' that drives cross-industry and international connections (AEB Annual Report, 2014). The local denim industry is also tied to the city's aim of enabling sustainable economic growth. Denim City, launched by House of Denim in 2015, is singled out as a success story of this strategy (AEB Cluster Strategy, 2014, p. 7). Moreover, the Amsterdam Metropolitan Region is internationally renowned as a centre of denim expertise with an important focus on sustainability. A technological specialization in apparel (especially denim) and in sustainability in the Amsterdam Metropolitan Region has evolved, creating a strong clustering of local knowledge, expertise and capabilities that link global apparel and denim manufacturing and social and ecological sustainability.

We selected a specific project in Denim City that focuses on using post-consumer recycled denim (henceforth, PCRD) in jeans production. The aim of PCRD was twofold: 1) to collectively produce and promote post-consumer recycled denim and 2) to educate students of the Jean School to work with sustainable materials. PCRD involved four main collaborating partners: the intermediary organization (Denim City), an Amsterdam-based denim brand (henceforth Denim Brand) that has been at the forefront of sustainable denim production, an Amsterdam-based social entrepreneur (henceforth Textile Collector) that

collects used textiles in the greater Amsterdam area, a Dutch recycling company (henceforth Recycler) and an international denim mill based in Spain (henceforth Denim Mill).

PCRD has two distinct phases. The first phase started in the fall of 2014 and launched a product collection in the spring of 2015. The goal of the first phase was to use 20% recycled cotton in denim fabric production. The second phase of PCRD, which is currently on going, aims to use 25% recycled cotton and 25% hemp in denim fabric production. The second phase includes a new hemp partner.

Data Collection

We collected data using a variety of sources and techniques to increase the construct and internal validity and reliability of the data. We gathered data from semi-structured interviews and direct observation, both guided by protocols, and from archival documents. We created a case study database so that we could chronological follow the project and the associated documentation. The in-depth interviews were held with the collaborating firms at two points in time over a six-month period. The first set of interviews was held shortly before the end of phase one. We gathered data retrospectively about the start of the project. The second set was held during phase two of PCRD and we gathered data about the progress and outcomes. During the six-month period we visited Denim City several times and observed how collaboration took place in the physical space.

Data analysis

We transcribed the interviews and coded the transcripts using thematic first and second order codes. We also created a narrative of the interviews to understand the time and sequence of events as they unfolded. We discussed and verified the narrative account with the respondents. Using these techniques and guided by theory, we devised analytical constructs with which to further analyse the data. We moved iteratively between using pattern matching of the transcripts and explanation building techniques. Explanation building is often used in conjunction with pattern matching and allowed us to uncover causal links and explain why or how a particular event or outcome occurred (Yin, 2003).

Findings

From our data it is apparent that different types of knowledge were accessed and utilized during the course of the PCRD project, knowledge both locally embedded and globally sourced, and that these different types of knowledge were accessed at different times and through a variety of sources.

Access to knowledge

Denim City, and in particular the project manager for the PCRD project, played a central role in bringing the other partners in the project together and acted as the intermediary organization. As the initiator of the project, Denim City directly approached the Denim Brand for participation in the PCRD project:

> "The next step [was], are there partners, denim brands that are interested in participating in the project? And yes, the Denim Brand was found quite quickly and became our first partner."

The other partners in the PCRD project were accessed and sourced using the social capital ties of the existing partners. PCRD's main sponsor, the Textile Collector, played a pivotal role, especially at the start. The PCRD project manager elaborated:

> "Denim city is embedded within a large network of partners, and from the start, the Textile Collector has been part of PCRD as a sponsor, and they have also helped us to connect with the Recycler. And so I just called [the Recycler] and told them what we were doing, and … like everyone else we reached out to, they liked the project a lot and were very willing to collaborate."

Our evidence shows that the PCRD's network grew organically and informally from existing social ties. The following quotation clearly summarizes this:

> "It's been quite an organic process … from the moment that we started working on the project … because of all brands in and around Amsterdam, they are the most sustainable … They responded enthusiastically right away … So it all came together without much effort, we did not have to set up an enormous … structure."

Yet, additional partners were added to the PCRD project selectively. Both Denim City and the Denim Brand stated that the initiative was open to (more) new partners, but in practice, adding new partners along the way proved to be quite challenging. This was apparent in the second phase with the inclusion of the new hemp partner:

> "… our hemp experiment hasn't really been going the way we wanted it to go … we wanted to include Dutch hemp in our fabric and we tried ... but the quality and quantity that is available from the Netherlands isn't good enough ... so that has caused some delays."

The PCRD project thus carefully selected potential new partners in order to control quality and reduce delays, even if it meant that it limited their access to new knowledge. This is illustrated by another example of a potential partner that had a storytelling technology, e.g. to trace the origin of a product's materials. The 'story of the product' could be told, for example, by scanning a button. However, the technology was too experimental, as the following quotation clarifies:

> "… the technology [an online storytelling technology] just wasn't there yet, and so that meant [a] delay [in] the process … It is very useful to look into such things and we have learned a lot from it … but not everything that crosses our path fits into the bigger picture …"

In the two phases of the PCRD project, there has been one Denim Brand that has created a product collection. For continued growth and expansion of PCRD, the project manager was confident that more brands would be interested in joining the PCRD project.

> "It's our goal for the future, when we find the perfect composition for the material, to attract more brands ... and the Denim Brand has an open attitude toward this. In the end every brand … has its own design … so they are not scared of competition, but of course this does not hold true for all brands ... however I am confident we will be able to interest more brands [for the PCRD project]."

The Denim Brand confirmed its openness towards more brands entering the PCRD project, but added that they would like to be the exclusive owner of the innovation for at least the first six months before other brands could start using it.

Exchange of knowledge

The PCRD project partners expressed that, overall, collaboration and exchange of knowledge within the PCRD project went quite smoothly. Denim City managed and shared knowledge about the process, e.g. communication, planning and logistics, with the other project partners. Technological knowledge and know-how was accessed from both the Denim Brand and the Denim Mill. However, technical knowledge was also transferred directly between them without Denim City. The PCRD project manager explained this as follows:

> "We at Denim City instruct the Denim Mill ourselves, but when the Denim Brand has a more technical question, and of course they have much more product knowledge than we have, it would be quite silly to say: ok please tell us what you want to know from the Denim Mill and then we will talk to them. In my opinion, you lose a lot of valuable information that way. And our aim is to work together … so it is much smarter to say to [the Denim Brand] just give [the Denim Mill] a ring and discuss it directly."

The exchange of knowledge was aided by the iterative nature of the collaboration, in the sense that the 'outcome' of each step led to the next step without any 'strict' planning in place. Challenges faced were mainly technical in nature. For example, during the first year of the collaboration the PCRD project had hoped to produce a denim fabric with 20 percent post-consumer recycled denim. However, this goal turned out to be too ambitious and they could only produce a denim fabric with 18 percent post-consumer recycled denim that met and maintained the standards of a high quality product. Since producing high quality denim was the main goal, any delays caused by 'quality issues' of the fabric were regarded as important iterative steps in the process. Thus, adjusting and even lowering their goals was seen as a natural and necessary step. The following quotation from the PCRD project manager exemplifies how this 'flexible' goal setting worked in practice:

> "we [Denim City and Denim Brand] clearly instruct the Denim Mill about what we want, but well, in the end they have to do it, so they react … We send samples to [the Denim Mill] and they provide feedback, like, this is not good enough to create a high quality product. So in that sense, they directly respond to the goals we set … 'what you have in mind with this product is not realistic', that was more or less their response."

Additionally, PCRD's flexible goal setting was enabled by a flexible planning. The following quotation illustrates this:

> "Last year it all went very smoothly ... we were able to launch the PCRD fabric during the Amsterdam Denim days ... that was also when the first collection was ready and we could start selling it ... but we won't be able to do that this year … there is space for such delays because we do not have a [strict] planning that indicates when our next collection has to be ready."

Thus, even though goals for the collaboration were collectively set by Denim City and the Denim Brand, the Denim Mill provided technical feedback about the quality of the samples, and it was this feedback that directly affected if goals were adjusted. This flexibility was, in a sense, an enabler of the successful transfer of knowledge.

Besides flexible goal setting and planning, the informal structure and short and direct lines of communication between the PCRD partners were also important enablers of the transfer of knowledge. Primarily, the PCRD project manager and the Denim Brand determined the planning and decision making. The PCRD project manager explained that "we just meet and say: ok this is what it is going to be, how are we going to do this, what is the timing, planning, which collection are we going to create …". The informal and direct lines of communication aided their collaboration, "… because the Denim Brand and the Denim Mill knew each other … this industry, especially in Europe, is very small and everybody knows each other."

Also, the PCRD project manager explained that being both geographically as well as cognitively close aided their collaboration and exchange of knowledge:

> "The collaboration was good, my contact with them [the Denim Brand] is really good ... We are a small company, they are a small company, so we have short lines of communication and we are both located in Amsterdam ... that does help of course … it is very easy to say: let's meet! We can be very flexible … especially because we are neighbors … and likeminded partners … we have the same goals ... that is a real necessity for a project like this."

Discussion

Our findings from our in-depth case study of an open innovation knowledge platform provide insights into local-global knowledge sourcing and exchange. The knowledge platform focused on a particular problem in the denim industry and initiated a project for the development of denim fabric that is partially composed of post-consumer recycled cotton. By following the sourcing and exchange of knowledge between project partners, we come to two main observations.

Our first observation is that the open search strategy used to source knowledge was narrow in scope, drawing on few sources of technical and market knowledge and especially on sources that were cognitively and geographically close. However, although the breadth of external knowledge sources was limited, the intensity of knowledge exchange with these sources was deep. This finding illuminates a more nuanced understanding of open search strategies (Herstad, Aslesen and Ebersberger, 2014; Garriga et al, 2012; Laursen and Salter, 2006) and specifically for creative industries, for which appropriability may be a greater challenge to protect.

This finding is consistent with the findings from Garriga and colleagues (2012), namely that the breadth and depth of search strategies is significant for incremental innovation but not for radical innovation. However, it is subjective whether a denim fabric composed of post-consumer recycled denim is a radical or incremental innovation. Our argument is that the PCRD project focused on radical innovation, as it represents a change to the existing frame for manufacturing denim (Norman and Verganti, 2014). In this view, a narrow but deep open search strategy for external knowledge incentivizes partners to collaborate because

appropriability and risks of the new technology can be better managed (Ritala and Hurmelinna- Laukkanen, 2013). Thus, we extend the current literature on open search strategies by unpacking the use of wide and deep open search strategies and show that depth of open search strategy is more closely associated with radical innovation.

Secondly, in line with Laursen and Salter (2014), we observe that high levels of appropriability risk reduce openness, limiting knowledge exchange in the network and particularly by excluding other competing firms that can use the technology for product development purposes. However, the partners in the platform were more open to firms that supported and added knowledge to the technology development (e.g. the inclusion of the hemp supplier). This may reflect characteristics of the industry; in the creative industries, it is difficult and costly to protect new technology through patenting. Secrecy is preferred, especially since much of the innovation is based on design and the fast changing nature of product development poses limits on other forms of intellectual property protection.

We also see that the different partners in the platform have differential interest in the appropriability of the new technology (Herstad et al, 2014; Laursen and Salter, 2014). For the intermediary organization, Denim City, there is an incentive to share the newly developed knowledge and technology with other potential denim brand partners. The project exemplifies their mission and goals of facilitating open innovation for sustainable denim production. By recruiting more denim brands to join the initiative, Denim City gains more credibility. However, the Denim Brand has fewer incentives to share knowledge and technology with other brands and emphasized the desire to gain monopolistic rents from the technology before opening it up to other competing firms. From this anecdotal evidence, there are clearly limits to openness when competitor firms are involved in open innovation knowledge platforms.

Furthermore it can be argued that openness is more limited when initiatives involve competitors and are focused on new product innovations as opposed to a higher level of openness among competitors when the innovation and knowledge exchange is focused on managing risks in sustainable production (e.g. safeguarding worker rights or reducing chemical pollution). Our work can only highlight this complex relation between appropriability, openness and competitor firms. If collaborations are more open, then this may deter competing firms from participating because there is little economic gain from the innovation. If collaborations are more closed to increase technological appropriability for a few partners, then absorptive capacity and ultimately innovative performance may suffer. Our findings suggest that, by including competitor firms in collaborations, there are compromises in open innovation on either the ability to appropriate value or the ability to be open (Ritala and Hurmelinna- Laukkanen, 2013).

Our findings also show that the informal and flexible structure of the PCRD project acted as an enabler of deep knowledge transfer. We argue that this flexible and informal structure was possible due to the close proximity of the project partners, especially geographic and cognitive proximity (Ernst and Kim, 2002). The majority of the partners in the PRCD project were locally based. Conflicts, adjustments in planning and technical issues could be easily and spontaneously discussed. This finding is in line with the literature on the local embeddedness of tacit, sticky knowledge (Asheim and Isaksen, 2002; Presutti et al, 2011). The preference for locally embedded partners placed limits on the breadth of search for potential knowledge sources. However, we also see that when partners were not

geographically proximate, they were cognitively proximate through either their prior experience in working together or their distinctive industry knowledge. This insight reveals an additional explanatory factor that aids open search strategies, namely that the breadth and depth of open knowledge sourcing is influenced not only by geographic proximity but also cognitive proximity.

Our findings have implications for practitioners and policymakers. First, managers need to clearly weigh the trade offs between openness and appropriability, crafting strategies that enable the broadest possible search for knowledge and agreements to safeguard value appropriation. The use of proximity measures could also help managers evaluate the inclusion of partners in open collaborations and the effects on the sourcing and exchange of knowledge. For policymakers, our findings show that there are distinct advantages to local sourcing of knowledge as well as global sources of knowledge. Intermediary organizations play a pivotal role in bridging distance between these local and global sources. Policy, especially on a local or regional level, should encourage and support platforms that are managed by intermediary organizations and should facilitate the actors in innovation systems to extend their reach beyond their local or regional boundaries.

We have designed this study based on an in-depth single case in the apparel/textile industry. We are aware that our research design poses limitations for the generalization of our findings. However, we have selected a revelatory and typical case that provides insights into the underlying mechanisms of how local and global sources of knowledge are accessed and used. To this end, our study is a starting point for further research on the causal relation between locational proximity and open search strategies.

Conclusion

Understanding the local and global knowledge sourcing practices in open innovation collaborations is an important question for practitioners and policymakers and pertinent for economic development. The open innovation platform of Denim City provided a research context of rich data about local-global knowledge linkages. We find that, in a creative industries context, there is a relation between the underlying factors of type of innovation, the type of partners and the type of open search strategy. For our case, which focused on a radical innovation, the breadth of sources is limited but the depth of knowledge from those sources is considerable. The inclusion or exclusion of competing firms in the collaboration affected both the breadth and depth of open search strategies. Our study provides insights on the nuances between open search strategies from local and global knowledge sources and the type of innovation. We find that geographic and cognitive proximity are important factors in the depth of open search strategies. Our study has implications for practitioners and policymakers.

References

Almeida P., K. B. (1999). Localisation of Knowledge and Mobility of Engineers in Regional Networks. Management Science, 45(7), 905–917.

Amin, A., & Cohendet, P. (2005). Geographies of knowledge formation in firms. Industry and innovation, 12(4), 465-486.

Amsterdam Economic Board (AEB) Jaarverslag 2014. Stichting Amsterdam Economic Board. www.amsterdameconomicboard.com

Amsterdam Economic Board (AEB), Clusterstrategie Creative Industrie 2014-2020 (2014). www.amsterdameconomicboard.com

Arora, A., Fosfuri, A., & Gambardella, A. (2001). Markets for technology and their implications for corporate strategy. Industrial and corporate change, 10(2), 419-451.

Asheim, B. T. (2002). Temporary organisations and spatial embeddedness of learning and knowledge creation. Geografiska Annaler: Series B, Human Geography, 84(2), 111-124.

Asheim, B. T., & Isaksen, A. (2002). Regional innovation systems: the integration of local 'sticky'and global 'ubiquitous' knowledge. The Journal of Technology Transfer, 27(1), 77-86.

Asheim, B. T., & Coenen, L. (2005). Knowledge bases and regional innovation systems: Comparing Nordic clusters. Research policy, 34(8), 1173-1190.

Bathelt, H. (2005). Geographies of production: growth regimes in spatial perspective (II)–knowledge creation and growth in clusters. Progress in human geography, 29(2), 204-216.

Bathelt, H., & Gibson, R. (2013). Learning in 'organized anarchies': technological search processes and knowledge flows at international trade fairs. Regional Studies, 47.

Bathelt, H., & Cohendet, P. (2014). The creation of knowledge: local building, global accessing and economic development—toward an agenda. Journal of Economic Geography, 14(5), 869-882.

Bilgram, V., Brem, A., & Voigt, K. I. (2008). User-centric innovations in new product development—Systematic identification of lead users harnessing interactive and collaborative online-tools. International Journal of Innovation Management, 12(03), 419-458.

Bogers, M., & West, J. (2012). Managing distributed innovation: strategic utilization of open and user innovation. Creativity and innovation management, 21(1), 61-75.

Chesbrough, H. (2003). The logic of open innovation: managing intellectual property. California Management Review, 45(3), 33-58.

Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.). (2006). Open innovation: Researching a new paradigm. OUP Oxford.

Coe, N. M., Dicken, P., & Hess, M. (2008). Introduction: global production networks—debates and challenges. Journal of Economic Geography, 8(3), 267-269.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35, 128–152.

Cohendet, P., & Simon, L. (2007). Playing across the playground: paradoxes of knowledge creation in the videogame firm. Journal of Organizational Behavior, 28(5), 587-605.

Cooke, P. (2004). Regional Knowledge Capabilities, Embeddedness of Firms and Industry Organisation: Bioscience Megacentres and Economic Geography. European Planning Studies, 12, 5.

Cooke, P. N., & Lazzeretti, L. (Eds.). (2008). Creative cities, cultural clusters and local economic development. Edward Elgar Publishing.

Coombs, R., Harvey, M., & Tether, B. S. (2003). Analysing distributed processes of provision and innovation. Industrial and Corporate Change, 12(6), 1125-1155.

Crevoisier, O., & Jeannerat, H. (2009). Territorial knowledge dynamics: from the proximity paradigm to multi-location milieus. European Planning Studies, 17(8), 1223-1241.

Dahlander, L., & Magnusson, M. (2008). How do firms make use of open source communities?. Long Range Planning, 41(6), 629-649.

D'Este, P., Guy, F., & Iammarino, S. (2012). Shaping the formation of university–industry research collaborations: what type of proximity does really matter?. Journal of Economic Geography.

Edquist, C. (1997). Systems of innovation: technologies, institutions, and organizations. Psychology Press.

Ernst, D., & Kim, L. (2002). Global production networks, knowledge diffusion, and local capability formation. Research policy, 31(8), 1417-1429.

Feldman, M. P., & Audretsch, D. B. (1999). Innovation in cities:: Science-based diversity, specialization and localized competition. European Economic Review, 43, 409–429.

Florida, R., Gulden, T., & Mellander, C. (2008). The rise of the mega-region. Cambridge Journal of Regions, Economy and Society, 1(3), 459-476.

Florida, R. (2004). The rise of the creative class (p. 13). New York: Basic books.

Gann, D. M., & Salter, A. J. (2000). Innovation in project-based, service-enhanced firms: the construction of complex products and systems. Research policy, 29(7), 955-972.

Garriga, H., von Krogh, G., & Spaeth, S. (2013). How constraints and knowledge impact open innovation. Strategic Management Journal, 34(9), 1134-1144.

Gertler, M. S. (2003). Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there). Journal of economic geography, 3(1), 75-99.

Grabher, G. (2002). Cool projects, boring institutions: temporary collaboration in social context. Regional studies, 36(3), 205-214.

Hall, P. A., & Soskice, D. (2001). Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford University Press.

Heimeriks, G., & Boschma, R. (2013). The path-and place-dependent nature of scientific knowledge production in biotech 1986–2008. Journal of Economic Geography, lbs052.

Herstad, S. J., Aslesen, H. W., & Ebersberger, B. (2014). On industrial knowledge bases, commercial opportunities and global innovation network linkages. Research Policy, 43(3), 495-504.

Kauffeld-Monz, M., & Fritsch, M. (2013). Who are the knowledge brokers in regional systems of innovation? A multi-actor network analysis. Regional Studies, 47(5), 669-685.

Koput, K. W. (1997). A chaotic model of innovative search: some answers, many questions. Organization Science, 8(5), 528-542.

Langley, A. (1999). Strategies for Theorizing from Process Data. Academy of Management Review, 24, 691–710.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. Strategic management journal, 27(2), 131-150.

Laursen, K., & Salter, A. J. (2014). The paradox of openness: Appropriability, external search and collaboration. Research Policy, 43(5), 867-878.

Lundvall, B. Ä. (1992). National systems of innovation: An analytical framework. London: Pinter.

Lundvall, B. Ä., & Johnson, B. (1994). The learning economy. Journal of industry studies, 1(2), 23-42.

Maskell, P. (2014). Accessing remote knowledge—the roles of trade fairs, pipelines, crowdsourcing and listening posts. Journal of Economic Geography, lbu002.

Maskell, P., & Malmberg, A. (1999). Localised learning and industrial competitiveness. Cambridge journal of economics, 23(2), 167-185.

Maskell, P., Bathelt, H., & Malmberg, A. (2006). Building global knowledge pipelines: the role of temporary clusters. European planning studies, 14(8), 997-1013.

Maskell, P., & Malmberg, A. (2007). Myopia, knowledge development and cluster evolution. Journal of Economic Geography, 7, 603–618.

Nelson, R. R. (1993). National Innovation Systems: A Comparative Analysis. New York: Oxford University Press.

Nelson, R. R., & Winter, S. (1982). An Evolutionary Theory of Economic Change. Harvard University Press.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. Organization Science, 5, 14–37.

Nonaka, I., Toyama, R., & Nagata, A. (2000). A firm as a knowledge-creating entity: a new perspective on the theory of the firm. Industrial and Corporate Change, 9, 1–20.

Norman, D. A., & Verganti, R. (2014). Incremental and radical innovation: Design research vs. technology and meaning change. Design Issues, 30(1), 78-96.

Ocasio, W. (1997). Towards an attention-based view of the firm. Psychology, 1, 403-404.

Owen-Smith, J., & Powell, W. W. (2004). Knowledge Networks as Channels and Conduits: The Effects of Spillovers in the Boston Biotechnology Community. Organization Science, 15, 5–21.

Porter, M. E. (1990). The Competitive Advantage of Nations. New York: The Free Press.

Presutti, M., Boari, C., & Majocchi, A. (2011). The Importance of Proximity for the Start-Ups' Knowledge Acquisition and Exploitation. Journal of Small Business Management, 49(3), 361-389.

Ritala, P., & Hurmelinna- Laukkanen, P. (2013). Incremental and radical innovation in coopetition—The role of absorptive capacity and appropriability. Journal of Product Innovation Management, 30(1), 154-169.

Stam, W. (2009). When does community participation enhance the performance of open source software companies?. Research Policy, 38(8), 1288-1299.

Stewart, J., & Hyysalo, S. (2008). Intermediaries, users and social learning in technological innovation. International Journal of Innovation Management, 12(03), 295-325.

Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. Research Policy, 15, 285–305.

Von Hippel, E. (1998). Economics of product development by users: The impact of "sticky" local information. Management science, 44(5), 629-644.

von Hippel, E. (2005). Democratizing Innovation. MIT Press.

Whitley, R. (1999). Divergent Capitalisms: The Social Structuring and Change of Business Systems. Oxford University Press.

Whitley, R. (2007). Business Systems and Organizational Capabilities : The Institutional Structuring of Competitive Competences. Oxford: Oxford University Press.

Yin, R. K. (2003). Case Study Research: Design and Methods (Vol. 3rd Edition). London: Sage Publications.