Does collective learning in clusters contribute to innovation?

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This paper explores the phenomenon of collective learning in the context of clusters, and investigates how collective learning contributes to the innovation performance of cluster firms. Collective learning is an interactive process of accumulating knowledge from different local resources. The process is made possible through several channels. Analysing data collected from 290 cluster firms, we identified three collective learning channels: interaction with local firms, interaction with local institutions, and interaction with the local labour market. Additionally, we tested how these channels contribute to innovation performance of cluster firms. The results reveal that local labour is positively related to innovation performance, while indicating that interaction with local firms is negatively related to innovation performance. The conclusions discuss the policy implications of these findings.

Since their introduction in the literature, clusters and other forms of local agglomerations have been believed to embrace much more than mere economic transactions among the agglomerated firms. The role of knowledge and learning has been repeatedly stressed in the literature of regional development, starting with Marshall (1896/1952), who first recognised that organisations and knowledge grow interdependently within business. Despite being implicitly present in the regional development literature for a long time, it was not until late 1980s that knowledge and learning became a crucial focus in studying clusters and other forms of territorial innovation systems (Moulaert and Sekia, 2003). Since then, topics related to knowledge accumulation and learning processes within local production systems have been tackled by several scholars from local economic, economic geography and other related disciplines. Renewed understanding and re-interpretation of regional and local socio-economic realities came, on the one hand, from a broader shift toward the ‘knowledge-based’ or ‘learning-based’ view of the economy (Lundvall and Borràs, 1999; Lundvall, 2002) and learning region (Morgan, 1997; Florida, 1995), and on the other hand, because the traditional literature did not offer an analytical framework that could fully account for the sustained competitive advantage of regionally and locally clustered firms. Accordingly, the benefits of collective learning among locally clustered firms have been extensively discussed in the last few decades, but this literature increasingly perceived clusters to be almost closed systems, with most of the dynamics taking place within the boundaries of the cluster.

The localised learning argument has often been understood to mean that local collective learning is viewed as the only source of the innovation dynamism of cluster firms. It went as far as presenting it as a superior form of learning that might take the role of interactive learning at the national and international levels or even substitute internal learning within the firm (Capello, 1999b). This perception, which was described by Malmberg and Maskell (2006) as ‘a plain misunderstanding’, described clusters as being somehow self-sufficient in knowledge terms. This has led to a rather heated debate (Street and Cameron, 2007; Malmberg and Maskell, 2006; Bathelt et al., 2004; Owen-Smith and Powell, 2004; Malmberg and Power, 2005), which proved that interactions with distant partners are at least as important as those with cluster actors and that learning might be best understood as a combination of close and distant interactions. However, these arguments...
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Collective learning and innovation: theory and development of hypotheses

This section presents the concept of collective learning in clusters and develops a comprehensive literature review on the relationship between collective learning and the innovation performance of cluster firms.

Collective learning in clusters

The concept of collective learning was introduced to the regional (local) development literature in the 1980s by the Groupe de Recherche Européen sur les Milieux Innovateurs; it lies within the heart of the milieu innovateur theory and refers to the presence of common knowledge, which goes beyond the boundaries of the firm but remains within the spatial boundaries of the milieu (Capello, 1999b). The concept has been further developed by the Cambridge group (Keeble and Wilkinson, 1999, 2000a,b; Lawson, 2000; Lorenz, 1996). They explicitly developed the concept of collective learning to connote to a broad notion of the capacity of a particular regional innovative milieu to generate or facilitate a learning process and innovative behaviour by members of the milieu (Keeble, 2000; Aydalot, 1986; Keeble et al., 1998; Camagni, 1991). Almost simultaneously, the idea of the importance of learning among locally clustered actors was adopted by Scandinavian researchers (Asheim et al., 2006; Malmberg and Maskell, 2006; Malmberg and Power, 2005; Lorenzen, 2007, 2001) and other European scholars (Steiner and Hartmann, 2006). There are several definitions of collective learning but in general, authors refer to a social process of learning, based on a set of shared rules and procedures that allow individuals to coordinate their actions in search of a problem’s solution (Capello, 1999b; Rallet, 1993; Favereau, 1994; Livet and Thévenot, 1994; Haas, 1996). Based on the existing literature and our understanding of collective learning, we define collective learning as an interactive process of accumulating knowledge from different local resources. The process takes place in a socialised way within the cluster and as such is underlined by geographical, socio-economic, organisational and cultural proximity between actors, which encourages mutual understanding and trust-building among cluster actors.

As presented in Figure 1, clusters incorporate a number of different actors and consequently collective learning can take several different forms: from collaboration in research and development teams or joint research projects to education and training seminars and many others (Malmberg and Maskell, 2006; Anselin et al., 1997). However, it can also occur more informally during gatherings in local restaurants, lobbies of local organisations, networks with fellow graduates or other social network events (Steiner and Hartmann, 2006). Malmberg and Maskell (2006) have identified three main sources of

are only supported by a small base of empirical evidence (Gertler and Wolfe, 2006; Giuliani and Bell, 2005; Caloghirou et al., 2004; Cotic-Svetina and Prodan (in press)). Therefore, this paper explores the relationship between collective learning and innovation. More specifically, it investigates how different collective learning channels influence the innovation performance of firms located in clusters. The empirical research is based on data from 290 cluster firms. From a theoretical perspective, this paper seeks to identify the role that specific channels have in enabling and promoting collective learning among clustered firms. From a practitioner’s perspective, the increased understanding of learning patterns in a cluster setting may improve a cluster’s learning capability and consequently its innovative potential.

The remainder of this paper is organised into five sections. The second section presents the theoretical context in which the concept of collective learning has been developed and used, and hypotheses are developed. In the third section, we briefly describe the methodology. The findings are presented in the fourth section. The paper ends with a discussion and presents possible directions for future research.
Based on the existing literature and our understanding of collective learning, we define collective learning as an interactive process of accumulating knowledge from different local resources. The process takes place in a socialised way within the cluster and as such is underlined by geographical, socio-economic, organisational and cultural proximity between actors, which encourages mutual understanding and trust-building among cluster actors.

Collective learning in clusters that relate to three dimensions: vertical, horizontal and social. In the vertical dimension, firms in the supply chain are specialising in different stages of the production process and the output of one firm is often the input of the other, leading to complex input–output relationships between firms. Gordon and McCann (2005) and Malmberg and Maskell (2002) have shown that those vertical linkages are predominantly local, making them an important element in the collective learning process. Another dimension in localised clusters is related to the presence of several firms operating in the same industry and producing a similar output. This dimension is described as horizontal, because it relates firms that are mainly rivals and competitors (Malmberg and Maskell, 2006; Maskell, 2001). If we add the presence of numerous non-firm institutions, especially universities, research centres and other knowledge organisations, important industry–academia links are formed. The third dimension, called social, is not reflected in inter-firm relations, but rather is inherent in the everyday life of people who live and work in the cluster setting. Such processes of information and knowledge exchange are often unrelated to the conscious undertakings of the firm but are more of a side-effect of being located in the cluster. Several expressions have been used to denote this phenomenon: local buzz (Bathelt et al., 2004); local broadcasting (Owen-Smith and Powell, 2004); or noise (Grabher, 2002). In general, this phenomenon refers to ‘information and communication ecology created by numerous face-to-face contacts as people and firms within the same industry collocate’ (Malmberg and Maskell, 2006, p.7). Through day-to-day interaction, actors continuously contribute to and benefit from the diffusion of information, gossip and news by just ‘being there’ (Gertler, 2004).

Although collective learning is perceived as a complex interactive process, authors generally recognise four main collective learning channels: interaction with local firms, spin-off activity, cooperation with local institutions and a stable local labour market (Capello and Faggian, 2005; Keeble and Wilkinson, 2000a; Capello, 1999a,b; Keeble

Figure 1. Interactive process of learning in clusters
et al., 1998; Camagni, 1991). We now present these four channels and their roles in a firm’s innovation.

**Toward the research hypotheses**

Innovation is definitely among the most often discussed benefits of collective learning (Capello and Faggian, 2005; Tödling et al., 2006; Mitra, 2000; Camagni, 2003a,b). The central idea in clusters is the fact that the overall innovation performance depends not only on the performance of specific organisations, but also on how they interact with each other (Salmi et al., 2001). This connection suggests that factors which foster or frustrate innovation activity are not limited to a single firm (Cooke and Morgan, 2000; Mitra, 2000). Since firms are not only embedded in local innovation networks but also in wider social networks at the global level (Grabher, 2002), they acquire new knowledge and consequently learn at the local level as well as through national and international channels (Owen-Smith and Powell, 2004; Bathelt et al., 2004; Ashein and Coenen, 2005).

Despite the extensive research on collective learning and innovation, the relationship between the two has not yet been completely revealed. The positive relationship between collective learning and regional innovation has been implicitly proposed (Camagni, 2003a; Salmi et al., 2001; Mitra, 2000; Porter, 2000). However, the influence of collective learning on an individual firm’s innovation performance has only been partially based on the empirical evidence using quantitative methods (Capello and Faggian, 2005; Caloghirou et al., 2004; Capello, 1999b). Those empirical studies confirm the positive relationship between the collective learning process and a firm’s innovation. However, some recent conceptual contributions have queried the superior role of local collective learning in a firm’s innovation process (Gertler and Wolfe, 2006; Bathelt et al., 2004). Although providing very valuable insights, the existing studies do not determine the role of collective learning in a unified way. Therefore, our aim is to test the relationship between each collective learning channel and the innovation performance of firms and thus contribute to the current debate on the role of collective learning in the innovation process.

While Capello and Faggian (2005) and Capello (1999b) have investigated the role of collective learning by focusing exclusively on learning within the cluster, other authors expanded their view and have tested the influence of several internal as well as external knowledge sources on innovation performance of cluster firms (Caloghirou et al., 2004; Cotic-Svetina and Prodan (in press)). In the following paragraphs, we present the main theoretical arguments for the role of collective learning channels in a firm’s innovation process and develop four main hypotheses.

The existence of the local labour market and high mobility of labour are one of the most important characteristics of clusters and other forms of regional networks. As Scott (2006, p. 236) has stated, local labour markets have an ‘absolutely critical role in sustaining high levels of performance in local economic systems’. The theoretical literature has drawn attention especially to the extent and role of the mobility of skilled individuals and teams within the cluster, which leads to the diffusion of embodied and tacit technological know-how as well as organisational expertise (Camagni, 1991; Lorenz, 1996; Keeble et al., 1998). While highly qualified workers move within cluster firms and other organisations, they are transmitting valuable knowledge. Accordingly, local firms can benefit from a growing local pool of technological, organisational and research expertise. Case studies of successful clusters reveal the importance of local recruitment of scientists, engineers, research staff and experienced managers for knowledge transfer and collective learning. Besides speeding up the dissemination of knowledge, labour mobility often leads to new combinations of knowledge (ideas, methods etc.) (Power and Lundmark, 2006). Additionally, staff mobility is likely to create valuable bonds between local firms and institutions, thereby representing an active part of cluster and network building. Therefore, we can conclude that the literature offers theoretical as well as empirical arguments that assume that mobility within the local labour market boosts a firm’s innovation. This has led us to the formulation of the following hypothesis:

**Hypothesis H1**: Collective learning operationalised through the local labour market positively influences a firm’s innovation performance

An important type of movement of local labour is through spin-off activity, where entrepreneurs with research, engineering, scientific and managerial know-how take ideas and expertise that they have developed within a parent firm or organisation and start a new business and exploit new technology, develop innovation or market opportunity (Keeble, 2000). Local clusters are believed to provide both the social and economic preconditions for spin-offs and improve the possibility of their success. Spin-offs usually develop from existing cluster firms, universities and research laboratories and enable the transfer of skills and knowledge through the movement of the labour force from the existing cluster actor to the emerging firm. Through spin-off, entrepreneurs diffuse expertise and competencies within a cluster and consequently augment the local pool of knowledge. Since spin-offs usually develop on new business ideas, they are believed to contribute to innovation, which underpins the following hypothesis:

**Hypothesis H2**: Collective learning operationalised through spin-off activity positively influences a firm’s innovation performance
The third channel of collective learning, and the one which has probably received the most widespread research attention, is cooperation between cluster firms. The theoretical literature explicitly or implicitly argues that collective learning happens through high levels of interaction and exchange of technical and organisational knowledge between firms, other organisations and individuals within the cluster. With respect to inter-firm collaboration, the greatest importance is placed on interactions between suppliers and customers (Capello, 1999a,b). But inter-firm cooperation extends far beyond the relationships that develop between partners in the supply chain. Studies of successful clusters reveal that some sort of collaborative arrangements develop between business partners as well as competitors (Keeble et al., 1998). This has led us to the formulation of the following hypothesis:

Hypothesis H3: Collective learning operationised through cooperation with other local firms positively influences a firm’s innovation performance

The local institutional environment is also considered to play an important role in enhancing the innovation capacity of local firms (Keeble et al., 1999; Nauwelaers, 2001). Amin and Thrift (1995) have stressed the importance of an interlocking and integrated web of supportive organisations and institutions including: financial institutions, local chambers of commerce, trade associations, local authorities, development agencies, innovation centres, government agencies, business service organisations, and marketing boards. In order to encourage collective learning, it is crucial that cluster institutions develop intensive two-way relationships with cluster firms, that they provide tailored services and that they play the role of independent nodes within the cluster and as such, serve as information and knowledge transmitters (Gambarotto and Solari, 2004). In this respect, the role of universities has probably been the most extensively discussed in the literature (Gunasekara, 2006). Universities and research centres represent an important source of educated and skilled labour creating a pool of local labour markets. They often act as incubators for entrepreneurs and their start-ups, or as a breeding ground for spin-offs. Universities and other educational organisations also train the existing labour force through executive and other educational programmes, which also attract qualified employees from outside the cluster (Cooper, 1971). Besides being crucial for knowledge creation and transfer, universities and research centres are often seen as lead players (Zagorske et al., 2008) in the clustering process as they develop and nurture the culture of inter-organisational cooperation and community-building (Keeble et al., 1998). Empirical findings show that regions with more knowledge institutions, such as universities, research centres and laboratories, are producing more innovative output due to knowledge spillovers that tend to be geographically bounded within a region where new economic knowledge is created (Giuliani, 2005; Giuliani and Bell, 2005; Jaffe, 1989; Jaffe et al., 1993; Feldman and Florida, 1994). Accordingly, we propose the following hypothesis:

Hypothesis H4: Collective learning operationised through cooperation with local institutions positively influences a firm’s innovation performance

We can conclude that a strong, localised, common knowledge base is established within clusters, which is created and reproduced by constant communication between local actors (Lorenzen, 2007). This knowledge base, together with the local institutional setting, gives rise to specific local competitive advantages that cannot be easily exploited by firms outside the cluster. However, this does not mean that clusters are in any way closed systems. In order to retain their learning and innovative potential, cluster firms additionally need to secure a constant inflow of fresh ideas and knowledge by simultaneously engaging in inter-organisational learning with firms outside the cluster.

Methodology

Sample and data analysis

Our research is based on microdata collected within the research project WEID (West–East ID: Industrial Districts’ Re-Location Processes: Identifying Policies in the Perspective of the European Union Enlargement), conducted under the 5th EU Framework Programme. For the analyses, 290 usable responses were obtained. The following methods were used to answer the main research questions. Discriminant and convergent validity were assessed using exploratory and confirmatory factor analysis (Floyd and Widaman, 1995). Exploratory factor analysis and reliability analysis were conducted in SPSS version 13.0. The EQS Multivariate Software version 6.1 was used for confirmatory factor analysis and testing of the proposed structural model. Because a small amount of non-normality was found in the data, the elliptical reweighted least squares method (ERLS) was used. ERLS minimises the problems deriving from data skewness and kurtosis and is otherwise comparable with the maximum likelihood method (Sharma et al., 1989). The fit of the model was assessed with multiple indices: the normed-fit-index (NFI), the non-normed-fit index (NNFI), the comparative fit index (CFI), the goodness-of-fit index (GFI), the standardised root mean square residual (SRMR) and the root mean square error of approximation (RMSEA). NFI, NNFI, CFI and GFI values equal to or greater than 0.90 indicate
a good model fit (Hair et al., 1998; Byrne, 2006). RMSEA and SRMR values equal to or lower than 0.08 indicate a good model fit (Browne and Cudeck, 1992; Hu and Bentler, 1999). The chi-square was reported, but was not given major consideration because it is highly sensitive to sample size and the number of items in the model (Bentler and Bonett, 1980).

Operationalisation and measure validation

In this study, independent, dependent and control variables were measured through scales previously tested and developed by the WEID research group (WEID, 2005).

Independent variables Independent variables were all measured with multiple items on a five-point Likert-type scale, ranging from ‘not important at all’ to ‘very important’. Interaction with local labour was measured using the following two questions:

- How important for your company is technical knowledge embedded in experts hired on the local labour market?
- How important for your company are organisational skills of the newly recruited staff?

Interaction with local firms was measured using four questions:

- How important for your company is technical knowledge derived from interactions with local clients and/or suppliers?
- Is technical knowledge derived from cooperation with other local companies?
- Are organisational skills gained from interactions with local clients and/or suppliers?
- Are organisational skills gained from cooperation with other local companies?

Interaction with local institutions was measured with the following four questions:

- How important for your company is technical knowledge gained from interactions with local public institutions (e.g. universities, public research centres, local government etc.)?
- Is technical knowledge gained from interactions with local semi-public institutions (e.g. chamber of commerce, industry association, trade unions etc.)?
- Are organisational skills learnt from interactions with local public institutions?
- Are organisational skills learnt from interactions with local semi-public institutions?

Exploratory and confirmatory factor analysis was conducted to explore the underlying structures of scales. As expected, exploratory factor analysis found three factors to explain the variance in the data. The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.81, providing evidence of the appropriateness of the data for factor analysis. Bartlett’s test of sphericity was significant, indicating overall significance of the correlations within the correlation matrix (Hair et al., 1998). The explained variance was 52.8%. To test for convergent validity of the constructs and to compare the one-factor structure with the three-factor structure (where factors are correlated), the confirmatory factor analysis was conducted. The results showed that one-factor structure (all variables load on one factor ‘local interactions’) is not appropriate because of the overall poor model fit (chi-square = 195.181, 35 df, probability 0.000; NFI = 0.85; NNFI = 0.84; CFI = 0.88; GFI = 0.85; SRMR = 0.09; and RMSEA = 0.13).

The confirmatory factor analysis showed that the three-factor structure (variables load on the following three factors: interactions with local labour, local firms and local institutions) fit the data rea-
reasonably well, with the following fit indices: chi-square = 124.725, 32 df, probability 0.000; NFI = 0.91; NNFI = 0.90; CFI = 0.93; GFI = 0.90; SRMR = 0.06; and RMSEA = 0.10. Table 1 shows factor loadings for the three-factor structure of local interactions. All factor loadings were above 0.4.

**Dependent variable: innovation performance**  Innovation performance was measured with five items. Respondents were asked to indicate whether their company had introduced or adopted any major changes to their (1) products, (2) processes, (3) organisation of production and (4) organisation of sales and distribution. Respondents were also asked to indicate whether their company had registered patents abroad in the last three years. The factor analysis indicated that all factor loadings were above 0.4.

**Control variable: region**  Region as a control variable was included in the model and operationalised as a dichotomous variable, where ‘0’ corresponds to western European countries (Italy, Germany and UK) and ‘1’ corresponds to eastern European countries (Czech Republic, Poland, Romania and Slovenia).

**Findings**

The structural relationships in the model were estimated using EQS 6.1. EQS reported that no special problems were encountered during the optimisation. All calculated model fit indices pointed to a good model fit (chi-square = 218.589, 95 df, probability 0.000; NFI = 0.89; NNFI = 0.92; CFI = 0.93; GFI = 0.90; SRMR = 0.07; and RMSEA = 0.07). The variance explained for the innovation performance was 18%. The model, which includes hypothesised relationships and results of the model test, is shown in Figure 2. An examination of our hypotheses is presented below.

**Hypotheses testing**

Hypothesis H1 proposed that the extent of the interaction with local labour was positively related to the innovation performance. The results presented in Figure 2 show that the interactions with local labour have a significant standardised coefficient of 0.50. The result thus provides strong support for Hypothesis H1. However, spin-off activity which is, in general, believed to contribute to a firm’s innovation performance, could not be tested in this proposition (Hypothesis H2) because there were only two spin-off firms in the entire sample. This may be due to the sampling process; however, it is very probable that spin-off activity is less common in clusters than has previously been suggested in the literature. In their study, Capello and Faggian (2005) also excluded spin-offs from their analysis because they identified only a few spin-offs and the inclusion of this variable would have considerably restricted their sample. Hypothesis H3 proposed a positive relationship between interaction with local firms and firms’ innovation performance. Hypothesis H3 was not supported because the result was the opposite of what was predicted (significant standardised coefficient of −0.46), indicating that interaction with local firms is negatively related to innovation performance. Hypothesis H4 assessed the relationship between interaction with local institutions and firms’ innovation performance. Hypothesis H4 was not supported (non-significant standardised coefficient of 0.13).

**Other findings**

The impact of region as a dichotomous variable was assessed (western European countries versus eastern European countries). The results indicate that firms from eastern European countries are significantly less innovative than those from western European countries (significant standardised coefficient of −0.17). The results also show that interaction with local labour, interaction with local firms, and interaction with local institutions are significantly correlated with each other. Although the correlation coefficients were somewhat high: 0.69 (local labour – local firms), 0.65 (local firms – local institutions) and 0.53 (local labour – local institutions), multicollinearity was not detected in the multivariate model.

![Figure 2. Results of the model test](image-url)
Discussion and conclusions

The purpose of this paper was to identify the channels of collective learning in clusters and test their influence on the innovation performance of cluster firms. Through factor analysis of the respondents’ answers, we have empirically identified three main channels of collective learning: interaction with local firms, interaction with local institutions, and interaction with the local labour market, which is in line with existing theory (Camagni, 1991; Capello, 1999a,b; Keeble et al., 1998; Keeble and Wilkinson, 2000a; Camagni and Capello, 2000; Capello and Faggian, 2005).

Based on the literature, collective learning is believed to positively contribute to a firm’s innovation in general; however, our data revealed that individual collective learning channels have a different influence on a firm’s innovation performance. The local labour market that develops within a cluster is the only collective learning channel that positively and significantly contributes to the improved innovation performance of cluster firms. Surprisingly, cooperation with local firms impedes innovation. The results presented in the previous section reveal that that local labour market that develops within a cluster is the only collective learning channel that positively and significantly contributes to the improved innovation performance of cluster firms. On the contrary, cooperation with local firms impedes innovation in cluster firms. The latter may seem surprising and conflict with some of the older literature on collective learning. However, recent (mostly conceptual) contributions in this field have started to question the importance of inter-firm cooperation in local clusters as one of the most important sources of innovation. In line with their discussion, our result shows that inter-firm cooperation is by no means limited to the local environment. Further, if firms limit their external learning process to local firms, they might become locked into the existing technological path and slowly start to lose the global innovation battle. The elements of the ‘atmosphere’ in the cluster, which may play a significant role as barriers to entry into the cluster, could also become barriers to exit. This would lock the cluster in a trajectory of conservation and atrophy (Bianchi, 1989) and prevent more radical innovations (Grabher, 1993). Many authors have stressed the importance of linkages with external firms, institutions or even networks, which provide access to external knowledge and technology and prevent the lock-in effect from occurring in the cluster (Geels and Deuten, 2006).

Collective learning literature and localised learning literature in general have been often criticised for not providing policy implications (Lorenzen, 2001), because it is often based on case studies and as such, cannot account for more generally applicable policy implications. This study can help to fill the gap by providing some policy implications. The results presented above raise questions about the prevailing approach of existing cluster programmes where policy measures are created to strengthen inter-firm cooperation within clusters (Cotic-Svetina et al. (in press)) and often fail to pay attention to the dynamic aspect of clustering, which arises from simultaneous competition and cooperation. We argue that policy programmes need to strengthen the competition among actors by encouraging start-up and spin-off processes within clusters as well as by opening the clusters to international actors. Policy programmes also need to focus on strengthening the competition among actors by encouraging start-up and spin-off processes in clusters as well as by opening clusters for international actors. In this way, clusters can experience an inflow of fresh ideas, new technologies and managerial approaches, which enable the cluster firms to gain (and retain) their global competitive position. It is important to not underestimate the role of links that cluster actors build with partners outside the cluster. This dimension is often forgotten by policy-makers, who tend to regard clusters as closed systems. When designing policy measures, all kinds of networking and collaboration within the cluster as well as with external partners should be encouraged. Accordingly, inter-firm cooperation and labour mobility should be encouraged within and between clusters and even among European countries in general. Firms should be encouraged to search for the best sources of knowledge and should not be locked in the cluster by policy programmes. As Cole (2007)

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and Mariani and Giuri (2007) have argued, mere geographic proximity is not enough reason to choose a firm as an innovation partner, and cluster policies should not consider the local level to be superior to other levels of the business environment. To maintain a constant flow of new knowledge and prevent the lock-in into the existing technological trajectory, firms need to nurture links inside as well as outside the cluster.

Since the very beginning, clusters have been recognised as localities of specialised firms that attract (and nurture) highly specialised and skilled workers who represent an incredibly important source of both technical and organisational knowledge. The role of the local labour market has since been discussed by many authors, and our results reveal that the existence of a specially qualified pool of labour and entrepreneurial talent is an important source of a firm’s innovation. Considering the crucial role of local labour in the transfer and creation of knowledge, it is important that regional governments promote the training and continuous professional development of local employees, improve the functioning of the local labour market and foster the mobility of specialised employees and researchers (as has already been discussed (Nerdrum and Sarpebakken, 2006; Holbrook and Wolfe, 2005)). If one wishes to strengthen a cluster and encourage collective learning, one should focus, on the one hand, on developing a critical mass of highly educated and skilled employees and, on the other hand, on encouraging labour mobility. The latter can be encouraged not only by rotation of staff between cluster firms but also through greater flexibility of the labour market according to the Danish flexicurity model. Once a cluster has been recognised as a provider of valuable knowledge, new firms will be established in that area, which will further strengthen the local knowledge base and stimulate collective learning and innovation.

The results of this study point to one interesting distinction. While many existing studies often suggest that the mere existence of collective learning means that firms will use the locally acquired knowledge in their innovation process, we argue that this is not always the case. In our opinion, the mere presence of collective learning channels does not by itself indicate that firms will be more innovative; however, we believe that collective learning processes can benefit a firm’s innovation performance. Whether or not firms and other cluster actors will benefit from using collective learning channels and turn the collective learning process into innovations greatly depends on the absorptive capacity of the firms (Murovec and Prodan, 2008). In general, the absorptive capacity refers to the ability of firms to learn and use the technological and organisational knowledge developed by other organisations. Cohen and Levinthal (1990) have defined its as ‘the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends’. Giuliani and Bell (2005) have moved the concept of absorptive capacity into the cluster setting and have defined the absorptive capacity of cluster firms as a firm’s capacity to decode and absorb knowledge that is potentially transferable from other cluster firms and organisations. Additionally, Capello (1999b) has mentioned the capacity to grasp the socialised knowledge by defining the internal capacity of each local firm to exploit collective learning as entrepreneurial expertise to turn knowledge, even if socialised, into a business idea. However, in the case of cluster firms, the extent to which firms will turn knowledge acquired from local environment into innovation not only depends on the absorptive capacity of each firm but also on the strategy of each firm to incorporate local knowledge into their innovation process. But that is beyond the scope of the present paper.

This study, like much empirical research, has certain limitations that need to be acknowledged. First, with regard to local collective learning, the problem of knowledge internalisation deserves to be mentioned. Local knowledge, which is often tacit and exchanged informally, is very likely to be internalised by cluster firms. Knowledge that is carried by workers as they move from firm to firm quickly becomes internalised and is incorporated into the knowledge base of the firm (Henry and Pinch, 2000; Cole, 2007). In this respect, collective learning moves from the cluster level (between local firms) to the firm level (inside the firm), and consequently firms perceive it as being generated internally. Accordingly, firms might underestimate the importance of being located in the cluster as they take for granted the benefits of specialised local labour markets, the proximity of similar firms and close linkages with local universities and other knowledge organisations. Secondly, the model of the influence of collective learning channels on innovation performance is not comprehensive (it includes a limited number of elements in order to make the empirical examination feasible) because it ignores some other factors that influence innovation performance. The main point to be acknowledged here is the fact that we only briefly discuss: the role of internal organisational learning and inter-organisational learning at the larger scale, for example, learning with other national and international partners. Finally, in this study, collective learning has been limited to localised clusters. As such, we do not address other contexts in which collective learning may appear at the local and regional levels.

Notes

1. Spin-off activity has been extensively identified in the literature as one of the four channels of collective learning. There are several case studies (such as the Cambridge (UK) region) that reveal strong evidence of active processes of spin-off and movement of research-focused entrepreneurs with embodied expertise who decided to establish their new enterprise within
the cluster (rather than moving elsewhere) (Keeble et al., 1999). However, not all clusters experience strong spin-off activity and external, so channel-source learning is perhaps not as general as the other three.

2. Shaker and Gerard (2002, p. 186) tried to improve the most commonly used definition, proposed by Cohen and Levinthal, and defined absorptive capacity as a set of organisational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organisational capability, which is pertaining knowledge creation and utilisation that enhances a firm’s ability to gain and sustain a competitive advantage.

References


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