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Innovation in symbolic industries: the geography and organisation of knowledge sourcing

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Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE)
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WP 2010/07
Innovation in symbolic industries: the geography and organisation of knowledge sourcing
Roman Martin and Jerker Moodysson

Abstract

This paper deals with geographical and organisational patterns of knowledge flows in the media industry of southern Sweden, an industry that is characterised by a strong 'symbolic' knowledge base. Aim is to address the question of the local versus the non-local as the prime arena for knowledge exchange, and to examine the organisational patterns of knowledge sourcing with specific attention paid to the nature of the knowledge sourced. Symbolic industries draw heavily on creative production and a cultural awareness that is strongly embedded in the local context; thus knowledge flows and networks are expected to be most of all locally configured, and firms to rely on informal knowledge sources rather than scientific knowledge or principles. Based on structured and semi-structured interviews with firm representatives, these assumptions are empirically assessed through social network analysis and descriptive statistics. Our findings show that firms rely above all on knowledge that is generated in project work through learning-by-doing and by interaction with other firms in localised networks. The analysis contributes to transcending the binary arguments on the role of geography for knowledge exchange which tend to dominate the innovation studies literature..

Keywords: knowledge base, cultural industry, regional innovation system, network analysis, Sweden.

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Title:

Innovation in symbolic industries: the geography and organisation of knowledge sourcing

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This paper deals with geographical and organisational patterns of knowledge flows in the media industry of southern Sweden, an industry that is characterised by a strong 'symbolic' knowledge base. Aim is to address the question of the local versus the non-local as the prime arena for knowledge exchange, and to examine the organisational patterns of knowledge sourcing with specific attention paid to the nature of the knowledge sourced. Symbolic industries draw heavily on creative production and a cultural awareness that is strongly embedded in the local context; thus knowledge flows and networks are expected to be most of all locally configured, and firms to rely on informal knowledge sources rather than scientific knowledge or principles. Based on structured and semi-structured interviews with firm representatives, these assumptions are empirically assessed through social network analysis and descriptive statistics. Our findings show that firms rely above all on knowledge that is generated in project work through learning-by-doing and by interaction with other firms in localised networks. The analysis contributes to transcending the binary arguments on the role of geography for knowledge exchange which tend to dominate the innovation studies literature.

Keywords: knowledge base, cultural industry, regional innovation system, network analysis, Sweden

Introduction

It is widely recognized, among researchers as well as among policy makers, that innovation is one of the key drivers behind sustainable regional economic growth. There is also consensus on the claim that such innovation based economic growth not only emanates from those industries that traditionally have been referred to as science based and (high-) technology oriented, but from more or less all segments of the economy. As opposed to the linear view on innovation (Bush, 1945), innovations are now largely understood as outcomes of interactive, non-linear, processes (Pavitt, 2005, Kline and Rosenberg, 1986). The trigger for renewal can thus in principle appear in any part of the problem solving sequence, through crucial input from various types of actors. In the last couple of decades, this view on interactivity has been further pronounced, with increased attention paid to economic activities transcending established sector boundaries (Boschma and Iammarino, 2009). There is however still a gap in the literature as regards how these cross sectoral interactive processes are organised, which actors are involved, where they are located in relation to each other and, not least, how and why these patterns of interaction differ between different types of activities based on different types of knowledge.

So far, explanations to observed patterns of interactive knowledge creation are best described as dichotomous or, in more elaborated discussions, binary. On the one hand, geographical proximity between interacting parties is seen as a crucial condition, enabler, or at least an important factor facilitating knowledge exchange between organisations and individuals (Boschma, 2005). The tacit dimension of knowledge is usually stressed as the factor calling for proximity and direct face-to-face interaction since such knowledge cannot be detached from the knowledge holder's mind and expressed through words or symbols (Polanyi, 1967). On the other hand, proponents of a diminished role of geographical proximity for knowledge exchange have stressed that globalisation and improved technological tools for interpersonal communication reduced these spatial barriers and the need for face-to-face interaction, thus enabling organisational proximity at distance (Gertler, 2008). The codified dimension of knowledge is stressed as the factor making most knowledge (sooner or later) ubiquitous and thereby less sensitive to space (Malmberg and Maskell, 1999). However, none of these arguments are convincing on a stand-alone basis, especially not since proponents of both arguments also admit that all knowledge has, and always has had, both a tacit and a codified dimension (Mokyr, 2003). In concrete studies of knowledge networks this becomes striking. Clusters of firms tightly knit together in various forms of (traded and untraded) interdependencies are also deeply involved in globally distributed networks (e.g. Hagedoorn, 2002). The conclusion from such studies would, if not problematised, imply that proximity seems to matter, but not always and not in all respects. Such a conclusion is highly unsatisfactory if not taken one step further in trying to specify when geography matters for knowledge exchange, in what respect, and why (Tödtling et al., 2009).

This paper contributes to filling this gap by presenting new findings on the spatial, sectoral and organisational patterns of innovation among actors representing a subset of sectors here referred to as 'symbolic'. Instead of joining in on the binary arguments on the role of geography for knowledge exchange roughly outlined above, this paper aims to qualify the discussion by arguing that deeper insights in the crucial *knowledge base* of actors, specifying the nature of the knowledge they share (beyond the tacit-codified dichotomy), contribute to transcending these binary arguments, explaining

when geography matters for knowledge exchange, in what respects, and why. The knowledge base approach (Asheim and Gertler, 2005, Cooke et al., 2007) takes account not only of the different combinations of tacit and codified knowledge inherent in all knowledge, but also, and more importantly, on the *contextual* dimension of knowledge and the underlying rationale for knowledge creation in various types of economic activities.

While 'analytical' and 'synthetic' knowledge differs primarily with regard to degree of tacitness, formalisation and ultimate aim for knowledge creation, 'symbolic´ knowledge can be distinguished primarily based on its context specificity. Thus, while knowledge production in industries defined as symbolic may be heavily influenced also by elements of both analytical and synthetic knowledge, the symbolic element calls for localised learning since the meaning of symbolic knowledge is highly variable between place, class and gender (Asheim and Hansen, 2009). To illustrate the points, findings from the present study are put in perspective through comparisons with previous studies on patterns of innovation in subsets of other sectors referred to as analytical and synthetic respectively (Asheim and Gertler, 2005). The group of actors (firms) selected for empirical study compose a media cluster located in the southernmost province of Sweden.

Spatial and organisational preconditions for knowledge sourcing: a review of dichotomies

One widespread assumption among academics studying innovation processes has been, and largely remains, that knowledge sourcing tends to be facilitated by short geographical distance between the learning counterparts (Gertler, 2003). Knowledge is thus assumed to flow smoother within than across the territorial boundaries of clusters. This assumption is shared also by scholars searching more broadly for explanations to the phenomena of agglomerations (Storper, 1997, Storper and Venables, 2004). Also in times when opportunities for individual mobility increase and the costs for transport and communication over distances decrease, agglomeration tends to sustain. There are thus other factors than pure costs and time constraints in play sustaining local concentrations of similar and related actors. Cognitive and social preconditions for knowledge exchange are usually described as being among the most influential of such factors. External economies arising from shared investments in and easy access to localised resources are thus no longer always as important as the localised learning taking place as a result of good relations between organisations in spatially concentrated networks (Malmberg and Maskell, 2006). Good relations are in this context defined as relations characterised by mutual trust and understanding.

These arguments are to a large extent based on Alfred Marshall's (Marshall, 1920) seminal work on industrial districts. The core of the argument is that geographical distance serves as a barrier for knowledge spillovers which actors embedded in a local milieu can benefit from without making particular investments. There are two main assumptions behind this argument. One has to do with accessibility and one with transferability. The accessibility assumption takes account of the actors' capacity constraints with regard to mobility and dissemination, while the transferability argument takes account of the nature and content of the knowledge that is to be exchanged. As already touched upon above, the mobility and dissemination argument has lost in importance as a result of globalisation. Pure physical (Euclidian) distance is less a barrier for interaction today, partly through improved means of transportation but also, and more importantly, through improved means of communication at distance.

The transferability argument though very much persists. Despite wide possibilities to meet and communicate on a global scale, many channels for transferring knowledge remain localised. One important reason is ascribed the tacit dimension of all knowledge (Nightingale, 1998). Even though *information* can be disseminated through various means of communication at distance, exchange of *knowledge* requires interaction collocated in time and space. This is due to the fact that the tacit element cannot be detached from the knowledge holders mind and expressed through words or other symbols. Transfer of tacit knowledge from one individual to another can thus only take place through demonstration and direct interaction (Polanyi, 1967, Malmberg and Maskell, 1999). In addition to this transferability argument, there is also a trust and reciprocity based argument. Through a mingling of personal and professional relations in the local milieu, actors are assumed to be more inclined to trust each other and to engage in knowledge exchange with neighbours than with actors located elsewhere (Gertler et al., 2000). Some scholars take this argument even further, stating that actors learn from such 'local buzz' more or less without intentions (Bathelt et al., 2004). Knowledge is thus assumed to *spill over* between firms and individuals (Audretsch and Feldman, 1996).

There are however at least two reservations to these assumptions appearing in the literature. The first is based on a theoretical argument and takes account of the absorptive capacity of actors exposed to spillovers. Even though there may be a relatively higher likelihood that collocated actors are exposed to knowledge flows between each other, learning also requires that they are able to adopt and make use of this knowledge (Giuliani, 2007). Such absorptive capacity presupposes a certain degree of cognitive similarity to allow understanding and a certain degree of cognitive dissimilarity to avoid redundancy (Nooteboom, 1999). Such optimal cognitive scope is defined by the specific knowledge of the actors rather than their complementary engagement in friendship or family relations. Actors who trust and like each other may be more inclined to share certain information, but they are not necessarily destined to learn from each other. The second reservation is based on an empirical argument and takes account of the few observations supporting the assumption on localised learning. Contrary to the theoretical arguments in favour of local knowledge spillovers as one of the key explanations to clustering, many studies oriented towards tracing knowledge flows between firms and related actors identify a low degree of local knowledge exchange in clusters compared to the global knowledge flows taking place (Hagedoorn, 2002, McKelvey et al., 2003, Gertler and Levitte, 2005). In science based (analytical) industries like biotechnology and some niches of ICT the most crucial flows of knowledge seem to take place in globally configured epistemic communities rather than in locally configured, trust based inclusive networks (Moodysson, 2008), but also in traditional (synthetic) manufacturing (Lagendijk and Boekema, 2008) and creative (symbolic) industries like media and film production, local clusters are highly dependent on input from non-local knowledge sources (Coe, 2001, Nachum and Keeble, 2003). The local environment is thus important, primarily as a source of specialised human capital, but knowledge exchange through bilateral collaboration (formal as well as informal) is, in some industries, relatively rare. Instead such intentional knowledge exchange is organised through 'pipelines', i.e. thoroughly planned networks anchored in formal agreements (Bathelt et al., 2004) or through interpersonal relations with peers (Knorr-Cetina, 1999, Powell and Grodal, 2005). These are built both on a local and a global scale, in some studies referred to as composing "Neo-Marshallian nodes in global networks" (Amin and Thrift, 1992).

This is obviously not to say that more or less unintentional knowledge spillovers do not take place. Buzz may very well serve as an important source of social capital formation in the local (or non-local) industrial environment, but the knowledge influencing innovation processes are usually sourced in a far more organised manner (Moodysson, 2008). The often referred to incidental meeting at the local pub or restaurant leading to breakthrough innovation is probably, at least in a Scandinavian context, nothing more than a fascinating story, maybe a onetime event that over the years has transformed into a widespread myth on how the seed for innovations usually occur. Nevertheless, the local environment sometimes offers advantages as source of knowledge, otherwise clusters would erode when the companies initially started as local spin-offs tap into international networks (or they would never have appeared in the first place). One such advantage is connected to the above mentioned mingling of personal and professional relations, not necessarily because it facilitates interpersonal trust and incentives for sharing knowledge about product development and technologies, but because it facilitates the transfer of rumours and various forms of strategic information (Grabher, 2002). One form of such strategic information is what Johnson et al (2002) coined "know-who" knowledge. This refers to knowledge about who knows what and what to do, i.e. insights into existing networks of competence and influence. In science-based industries such know-who knowledge is largely distributed in global communities (i.e. interpersonal professional networks), while there are reasons to believe that those networks are less geographically distributed in many other industries. Following our arguments on the context specificity of knowledge in symbolic industries there are reasons to expect that the moving media industry represents one such example. The argument is further developed in the next section, followed by an empirical assessment.

Transcending dichotomies: the knowledge base as decisive factor

Despite the fact that innovation takes place, and is seen as equally important, in more or less all parts of today's economy, most attention among innovation researchers has so far been dedicated to high-technology sectors. Innovation in the service sector is given less priority, and to the extent that low-technology industries are analyzed, main focus has been on technological upgrading, for instance through new combinations of industries (e.g. production and ICT, food and modern biotechnology etc). Nevertheless, the literature has highlighted the need to contextualize our understanding of preconditions for knowledge sourcing, and indicated that one of the most important explanations to differences between industries with regard to modes of and preconditions for innovation has to do with the specific knowledge base of companies composing respective industry. Keith Pavitt's well known taxonomy of industries (1984) largely takes account of the technological diversity of actors, distinguishing on the one hand between technology suppliers and acquirers, and on the other hand on the level of specialisation/sophistication. Asheim and Gertler's (2005) alternative distinction, which is used as main point of departure in this paper, follows a different rationale. Instead of comparing industries based on the technological scope and sourcing, they take account of the *nature of knowledge* which is crucial for the sector, the knowledge the sector cannot do without or, phrased differently, the knowledge that defines the fundamental basis of the actors' competitiveness (Moodysson, 2007).

The literature specifies three different types of such 'knowledge bases': analytical, synthetic and symbolic (Asheim et al., 2007a, Cooke et al., 2007). Innovation in industries drawing on an analytical

knowledge base is largely oriented towards development and application of basic science. The crucial knowledge is to a high degree codified, meaning is relatively constant between places, and the transfer of such 'propositional' knowledge from one organisation to another is therefore less sensitive to geographical distance between the exchanging counterparts. The basic rationale for knowledge creation is to understand the constituting parts of functional systems (e.g. machines) and explain the structures and mechanisms behind their workings. It is thus such ability of understanding and explanation that defines the foundation of the actors' competitiveness in this type of industry. Synthetic industries, on the other hand, are primarily oriented towards solving concrete practical, functional challenges, not necessarily through understanding and explaining the structures and mechanism behind them. The basic rationale for knowledge creation is thus to control functional systems. The crucial knowledge is to a much higher extent tacit, experience based and immediately connected to a specific application. For that reason the transfer of knowledge from one organisation to another is highly sensitive to geographical distance. Knowledge exchange requires physical co-location, primarily because the limited transferability of such knowledge requires direct face-to-face interaction. Due to the tacit dimension of such 'prescriptive' knowledge, meaning initially varies substantially between places (Asheim and Hansen, 2009), but through the process of diffusion, broadening the "metaset of feasible techniques" (Mokyr, 2003, p. 11), such context specificity becomes less pronounced over time. Innovation in symbolic industries, finally, draws on yet a different logic. Main purpose of these types of actors is to trig reactions in the mind of consumers. The innovation is not as much a product or a process as an idea and the impression that it carries. The basic rationale for knowledge creation is thus to shape meaning and desire through an affecting sensuous medium (Asheim et al., 2007a). The transfer of such knowledge from one organisation to another is not by definition sensitive to geographical distance, but due to the contextual nature of symbolic knowledge, the absorptive capacity of actors involved in knowledge exchange is highly localised, embedded in the socio-cultural milieu of the location of the firm.

It would, as mentioned above, be fair to claim that most attention in previous studies focusing on geographical preconditions for knowledge exchange in innovation processes has been dedicated to industries drawing on a combination of analytical and synthetic knowledge (Moodysson, 2008, Coenen et al., 2006) where symbolic elements are secondary. Yet, in parallel with the immense attention to emerging industries in the intersection of science and industry (especially biotechnology and to some extent ICT), there is a growing interest among scholars to learn more about innovation in industries representing the convergence of industry and arts (Lorenzen et al., 2008). These types of industries are sometimes referred to as 'creative' (Caves, 2000) or 'cultural' (Lash and Urry, 1994, Pratt, 1997, Scott, 2000, Power, 2002). Creative/cultural industries are, according to the classification introduced above, prime examples of industries drawing heavily on a symbolic knowledge base. The essence of a product or a process in these industries is an impression, an experience, an image or another type of intangible good whose prime function is materialised first when it enters the mind of the user (e.g. the consumer). The sign-value of intangible brands, impressions and (aesthetic) symbols is often superior to the actual use-value of tangible products in defining their success or failure (Lash and Urry, 1994). Since such sign-value is contingent on culturally defined values and schemes of interpretation, it is reasonable to expect that the learning processes that take place through interaction between firms and related actors in industries with strong symbolic components, as well as user-producer relations, are more localised than in analytical and synthetic industries

where such schemes of interpretations are more universal (e.g. scientific laws, engineering principles).

The remainder of this paper deals with spatial and organisational patterns of knowledge flows in a specific subset of such symbolic industries. Aim is to question the local versus the non-local as the prime arena for knowledge exchange among firms and related actors, and to examine the organisational patterns of knowledge sourcing. We enter into the question whether symbolic industries rely more on local than on non-local knowledge sources, and whether informal knowledge sources are considered as more important than formal sources. Explanatory factors are thus not sought in the tacitness of knowledge (as most traditional approaches have done), but in its contextual specificity. Based on the preliminary theoretical considerations outlined above, we would expect knowledge sourcing in symbolic industries to be above all a local phenomenon, and thus knowledge sources in spatial proximity to the firms analyzed to be of prime importance for their innovation activities. As regard the organisational patterns, we would expect a dominance of various forms of informal knowledge sourcing through interaction between firms and related actors and through users-producer relations, and a minor role of formal knowledge stemming from universities and other scientific organisations.

Empirical assessment: knowledge sourcing among moving media firms in Sweden

Research design

This study addresses these expectations through a combined survey and interview based study of actors specialised in moving media, located in Sweden. The moving media industry cannot be identified and delimited through established industry classification systems (e.g. NACE) but spans over a range of organisationally distinct, but functionally related, activities. Concrete examples are film and TV production, digital arts and design, development of computer games software and various graphical applications for computers, mobile phones and other hand held devices. What these activities have in common is that they all display strong symbolic components as regards their output and that they all, as regards key competences required in the innovation process, draw heavily on artistic skills as crucial complements to more traditional qualifications in fields like engineering, science and management.

The study pays main attention to the organisation and spatial distribution of knowledge flows among organisations (firms) engaged in such development and production. The analysis is based on a multilevel approach, combining a micro-perspective on activities and a system-perspective on the configuration of interacting actors. Detailed innovation biographies, drawing on a combination of in-depth interviews with key stakeholders and document studies, are used to illustrate the specificities of knowledge creation. An attempt is thereby made in filling the gap in the literature as regards preconditions for innovation in these industries. The assumptions/expectations on the spatial and organisational preconditions for knowledge sourcing in symbolic industries (specified in the previous section) are empirically assessed through social network analysis on firms composing the moving media cluster in southern Sweden.

The study adopts an inclusive approach to knowledge sourcing, covering bilateral collaboration as well as indirect interaction through mobility of key personnel (e.g. recruitment of staff), and monitoring of actors through various forms of interaction at arm's length (e.g. fairs and exhibitions, books, journals and magazines, surveys, the Internet). In addition to the spatial dimension, distinguishing regional, national and international knowledge sourcing, the study also reveals organisational and sectoral patterns of knowledge sourcing by measuring the extent to which knowledge exchange among the new media firms composing the source population takes place with actors representing (1) universities, (2) other firms from the same industry, and (3) other firms from other industries. While the first assessment (the spatial dimension) primarily targets the discussion on localised learning, the second (the organisational and sectoral dimension) takes account of the issue of cognitive scope and absorptive capacity. As touched upon above, these two dimensions are inseparable in an analysis of interactive innovation.

Descriptive statistics, and network diagrams accompanying them, form the basis for an analysis of the spatial preconditions for innovation in symbolic industries; how innovation processes are organised and to what extent and under which geographical conditions knowledge flows between firms and related actors. Interpretation of the quantitative data is influenced by insights from in depth interviews with innovating firms in which the innovation process as such was discussed in an open manner, without specific questions on geographical and sectoral distribution of knowledge networks. Instead, the interviewees were asked to describe their innovation processes, to explain the main rationale for activities carried out, what type of challenges they faced in different stages of the innovation process and how they handled these challenges. The analysis is followed by concluding remarks on how regional policy promoting innovation in this type of industry should be designed.

Introduction to the case

The moving media industry in Southern Sweden (epicenter in the city of Malmö) represents a new niche in a regional economy historically based on heavy manufacturing. The growth of the industry took off in the late 1990s/early 2000s in synergy with the rapid growth of the local university (Malmö University) which decided to employ a strategy focusing their research and educational activities on applied science and 'creative' activities (arts, design, moving images, etc.), partly as an attempt to distinguish themselves from the larger and more established Lund University with a strong focus on educations in science and engineering. The majority of the firms composing the media cluster are located in the western part of Malmö. This was the site of shipping and heavy processing industries until the close down at the turn of the century. The neighbourhood is now being heavily transformed. Regional authorities (Region Skåne and the Municipality of Malmö) have an explicit ambition to make this area the new landmark of the city. With regard to industrial activities, moving media covers the scope from traditional film and broadcasting to digital design and computer games software. A common feature of all these activities, despite their broad scope with regard to applications, is that they ultimately draw on a symbolic (artistic) knowledge base (Asheim et al., 2007a). Another shared feature, partly coming as a natural consequence of the crucial knowledge base, is that they are geared towards creating images and experiences rather than production. Project organisation and informal networking are important, formalised networks less frequent. Public policy support is perceived as very important for the future growth of this industry, not only by providing resources (e.g. subsidies and grants) but also by catering for the long term supply of

qualified labor (e.g. education policy) and for the formation of attractive living conditions for this type of workforce (Florida, 2002). However, the most highly profiled policy support program targeting this industry, Moving Media Southern Sweden (MMSS), is more concerned with network promoting activities than supply and sustainment of human capital in the region. The question is whether these activities reflect the real needs of the industry.

The illustrative case for a typical innovation process in this subset of symbolic industries is taken from a company working with development of user friendly graphical interfaces for hand held digital devices (e.g. mobile telephones). The company was founded by a group of six young designers; four engineers, one industrial designer, and one with a background in cinema studies. Their diverse educational backgrounds where unified through a shared interest in digital arts. After organising a series of art exhibitions in the early 2000s they were approached by a company developing computer games asking for their services. This, in turn, led to further jobs developing games for mobile telephones, and eventually to the formation of a company specialised in graphical interfaces. The company was based on a philosophy of design as something primarily targeting human interpretation, not visual performance. The design orientation in combination with cutting edge technology solutions shaped a winning formula. Today the company employs around 140 staff with development offices all over the world. Main unit for development is still located in Malmö. The problem solving sequence involves three main challenges, here revealed in order of importance from the company's perspective: (1) to differentiate and enhance the user experiences of portable devices, (2) to control the display (on a computer monitor) that allows the user to interact with the system, (3) to reveal the mechanisms defining the workings of data-enabled operating systems. By attacking these three challenges, drawing on a combination of engineering and art skills, however with core competence in digital design, the company now creates solutions applied by most major mobile telephone producers in the world.

Linking this illustration to the classification of knowledge bases introduced above, it is clear that all three knowledge bases, and the modes of knowledge creation characterising them, appear in this company's innovation processes. It is however the symbolic knowledge base that defines the fundamental basis of the firm's competitiveness, shaping the core of the innovation. The analytical challenge, revealing the mechanisms defining the workings of data-enabled operating systems, could in principle be carried out by any advanced service supplier specialised in data-enabled operating systems. The technological solution would not need to be tailor made for this specific application. Also the synthetic challenge, controlling the display of the device (in a functional sense), could be outsourced to a subcontractor. The symbolic challenge on the other hand, differentiating and enhancing the user experience of portable devices, constitutes the core of this company's innovation. The former would be of no specific use without the latter. Table 1 illustrates the innovation process of the company.

Table 1: knowledge bases involved in the innovation process of a moving media firm

	Analytical	Synthetic	*Symbolic*
Rationale for knowledge creation	Reveal the mechanisms defining the workings of data-enabled operating systems	Control the display (on a computer monitor) that allows the user to interact with the system	*Differentiate and enhance the user experience of portable devices (e.g. mobile phones)*
Modes of knowledge creation	Interpretation of existing systems by unravelling their structures	Experimentation, trial and error	*Advanced design based on visual experience and artistic skills (creative process)*
Knowledge characteristics	Formalised scientific knowledge (advanced mathematics)	Experience based practical/technical knowledge	*Knowledge adapted to (territorially confined) cognitive institutions (language, perception etc).*

Source: own draft inspired by (Asheim and Gertler, 2005, Asheim et al., 2007a, Gertler, 2008)

While this company is illustrative for symbolic industries also drawing on the other two knowledge bases, it is not necessarily the most representative case for the cluster under study. Due to the sectorally diverse composition of the cluster it is hard, not to say impossible, to find such a representative case. Besides technology intensive symbolic companies like the above example and the firms developing computer games software and the like, a large share of the companies in the cluster draw almost unilaterally on symbolic knowledge with more limited influences of analytical and synthetic knowledge. Among those are a large group of traditional film and TV producers. Most innovation processes are initially organised through projects, in large part building on informal networks of key personnel forming temporary alliances on an ad hoc basis (Grabher, 2004, Asheim and Isaksen, 2008). This is partly because the industry operates in a constantly changing market, even more sensitive to trends than most industries (maybe the financial sector excluded). Thus, flexible work-forms are needed to permit fast reaction on latest trends in shifting markets conditions. Projects are flexible since firms can acquire additional competences for a specific task without binding in long-term contracts (Lundin and Söderholm, 1995). Actors with specialised knowledge come together and carry out innovation though short-term cooperation. Consequently, knowledge about potential collaborators with complementary skills ("know who") is essential for these industries. The local pool of human capital suitable for such temporary alliances is therefore crucial for the performance of the companies. When it comes to the more long term established alliances between organisations in later stages of the development process, shared socio-cultural schemes of interpretation are decisive for the selection of partners. Returning to the example of the digital design company referred to above, they have, for this specific reason, established development offices in various parts of the world instead of only sales departments as most companies do. By being close to the market, sharing the culturally defined interpretive schemes of potential customers

and partners, they are able to adapt to the specific demands of respective region instead of providing standard solutions applicable to the entire global market.

Analysis

In order to explore the composition and innovation dynamics of the moving media industry, our analysis encompasses both qualitative and quantitative elements. Our main source of data draws on structured interviews with 37 firms situated in the region of Scania. The interviews were conducted between May and September 2008. The number of firms in the sample represents 52.1% of all moving media firms located in the region by that time. Since the majority of the firms working with moving media represent small and specialised niches of other more generic sectors (like ICT, advertising, software development etc) it was not possible to use official statistics to identify the source population. This was instead done through a dialogue with a regional support organisation specialised in moving media. Based on an inclusive list of actors whom this support organisation had identified as being involved in, or related to, activities classified as moving media, a manual selection process was carried out. Inactive firms and firms that only have sales departments in the region were excluded. So were independent artists and interest organisations without real commercial activities. After this selection process, the moving media cluster was defined as being composed by 71 companies. Most of them are small firms, the majority with less than 10 employees. Below follows a descriptive account on their patterns of knowledge sourcing through *monitoring*, *mobility* and *collaboration*. Monitoring refers to search for knowledge outside the organisational boundaries of the firm, but without direct interaction with these external sources. Mobility refers to retrieving knowledge input through recruitment of key employees from other organisations (e.g. firms, universities). Collaboration refers to exchange of knowledge through direct interaction with other organisations. Firms were asked to indicate the importance of those various sources of knowledge on a scale from 1 (very low) to 5 (very high). The results thus display *perceived* importance.

Knowledge sourcing through monitoring

As regards *monitoring* there is of course a range of possible sources of knowledge. Other firms doing similar things (competitors), universities and firms working with related and supporting activities (suppliers), and actors representing the users of the moving media firms' products or services (customers) are probably the most obvious primary sources of knowledge. However, in this section on monitoring, main attention has been paid to the 'secondary' sources, or intermediaries, carrying knowledge from these primary sources. Examples of such are scientific journals reporting results from basic research, surveys in form of questionnaires or interviews carried out and published by various types of business and support organisations, magazines specialised in issues connected to certain industries and/or technologies, and fairs and exhibitions focusing on the specific interests of the moving media industry or related fields. Due to the symbolic nature of moving media it is reasonable to expect a low importance of scientific journals as a source of knowledge input. Due to the informal and ad hoc oriented type of project organisation dominating the innovation activities, where know-who knowledge is considered far more important than know-what, it is also reasonable to expect a fairly low importance of the type of surveys described above. On the other hand, it is, for similar reasons, reasonable to expect a high importance of fairs, exhibitions and other types of

organised meeting places aiming to stimulate inter-organisational network formation. Since the moving media industry is strongly oriented towards creating and affecting perception, and since such perception is highly influenced by the socio-cultural context, yet supposed to evolve in line with current trends and fashion, it is also reasonable to expect that specialised magazines reporting such trends are considered important. In addition to distinguishing between these different sources of knowledge in our analysis, we also divide the findings into two different types of knowledge sourced through these means: technological knowledge which is required as direct input in the development of new or improved products and processes, and market knowledge which is knowledge about new trends and developments on the market. With the exception of fairs and exhibitions it would be reasonable to expect a generally lower importance of these types of secondary sources for market knowledge since this to a large extent is retrieved through interpersonal networks.

Table 2: the relative importance of various sources for gathering technological and market knowledge through monitoring.

%	technological knowledge				market knowledge			
	fairs	magazines	surveys	journals	fairs	magazines	surveys	journals
very high	17.1	13.9	5.6	5.6	13.9	22.2	2.8	5.6
high	8.6	36.1	8.3	13.9	22.2	22.2	22.2	11.1
moderate	42.9	22.2	25.0	25.0	30.6	25.0	25.0	25.0
low	14.3	13.9	25.0	22.2	16.7	13.9	16.7	25.0
very low	17.1	13.9	36.1	33.3	16.7	16.7	33.3	33.3
total (%)	100	100	100	100	100	100	100	100
n =	35	36	36	36	36	36	36	36

Source: own survey.

The results (see Table 2) are however similar for the two knowledge types, but differ considerably between various types of sources. Specialised magazines are the most important source for both technological and market knowledge. 50.0% of the interviewed firms consider magazines as important or very important for technical knowledge, 44.4% for market knowledge. Fairs and exhibitions rank second; they are considered important or very important for technological knowledge by 25.7% of the firms and for market knowledge by 36.1% of the firms. Whereas magazines and fairs seem to be essential, journals and surveys play a minor role for most companies. The share of firms considering scientific journals as important or very important is only 19.4% for technological knowledge and 16.7% for market knowledge; the result for surveys is similar. 33.3% of the interviewed firms explicitly attribute a very low importance to those sources of knowledge. These forms of knowledge disseminated through scientific journals and surveys are, as compared to the knowledge retrieved through specialised magazines and fairs and exhibitions, far from concrete application. Their meaning is universal and relatively constant between places. The moving media industry is in contrast, as touched upon above, very much dependent on more specific forms of knowledge generated through creative activities and interactive learning. Production processes are directed towards goods and services that include a high degree of aesthetic value, symbols and images that are very much context specific. For that reason, the moving media industry relies on information sources that are less formalised, but much more flexible, dynamic and just-in-time. It has turned out in the interviews that the actors above all rely on two additional knowledge sources. One

of them is the Internet, where information on the latest products, developments and trends are available. In this context, it can be seen as an intermediary knowledge source that does not necessarily require personal interaction. However, since actors take actively part in writing blogs, using twitter and cultivating their social networks over the Internet, it is very much used as a medium for direct and interactive knowledge exchange. This leads to a second additional knowledge source which is crucial for firms in the moving media industry: personal contacts and personal networks.

Knowledge sourcing through mobility

As regards *mobility* of highly skilled labour, the primary sources of knowledge specified above (firms, universities) can be accessed directly, i.e. without going through an intermediary medium transferring the knowledge. By asking from where they recruit their highly skilled employees, the relative importance of these various sources is assessed. Due to the symbolic nature of the crucial knowledge base for moving media it is reasonable to expect a low importance of universities and technical colleges for recruitment of key employees since these are very much oriented towards education in science and technology. One should though keep in mind that some universities also provide educations in arts and design, which may be relevant for some of the moving media firms. One should also remember that the innovation activities in moving media, as discussed above, *also* draw on scientific and engineering skills (e.g. informatics, computer programming etc). Finally, one should bear in mind that formal educations not necessarily reflects the actual skills of employees, especially in an industry largely drawing on artistic skills often retrieved in an informal manner during life. It is thus possible that universities and technical colleges contain large pools of qualified workers in totally different fields than what the educations as such would imply. However, this potential bias in the data should not be overestimated. Due to the specialised nature of knowledge required in this type of activities (as was also indicated in the analysis of knowledge sourcing through monitoring) it is also reasonable to expect a high importance of firms in the same industry for recruitment of key employees.

As regards the spatial dimension in connection to recruitment from these various sources it is reasonable to expect that the region and the nation stand out as more important than the rest of the world. This is partly due to the role of the socio-cultural context for the activities as such, and partly to the importance of personal networks based on know-who knowledge. Distinguishing between the various sources it is though also reasonable to expect that this importance of the local is more pronounced for firms in the same industry since these, at least according to our theoretical arguments, would be specialised in similar types of development and production. Complementary skills from universities, technical colleges and firms in other industries may be easier to find elsewhere since they are more universal by nature and less context dependent.

Table 3: relative importance of various sources for recruitment of highly skilled labour.

%	Recruit from universities	Recruit from technical colleges	Recruit from same industry	Recruit from other industries
very high	20.0	2.9	58.3	2.8
high	20.0	14.3	25.0	22.2
moderate	14.3	20.0	13.9	27.8
low	25.7	31.4	2.8	27.8
very low	20.0	31.4	0.0	19.4
total (%)	100	100	100	100
n =	35	35	36	36

Source: own survey.

Table 3 displays the relative importance of these various sources for the recruitment of highly skilled labour. The results show that supply of skilled workforce arises primarily from the moving media industry itself. 83.3% of the interviewed firms consider recruitment from the same industry as an important or very important part of their employment strategy, whereas recruitment from other industries is regarded as important or very important by only 25.0%. Higher education facilities play a minor role is this respect: universities are seen as important or very important by 40.0% and technical colleges by only 17.1% of the interviewed firms. A substantial share of the interviewed firms explicitly attributes a very low importance to labour flows from universities and technical colleges. These results are in line with our expectations and point in the direction that analytical and synthetic competences generated in the higher education sector are not of predominant importance for artistic based industries such as moving media.

Table 4: relative importance of sources and their spatial level for recruitment of highly skilled labour.

%		very high	high	moderate	low	very low	total (%)	n =
regional	University	35.5	22.6	6.5	12.9	22.6	100	31
	technical college	10.0	16.7	16.7	20.0	36.7	100	30
	same industry	64.7	17.6	14.7	0.0	2.9	100	34
	other industries	12.1	24.2	24.2	12.1	27.3	100	33
national	University	19.4	19.4	16.1	19.4	25.8	100	31
	technical college	0.0	13.3	30.0	26.7	30.0	100	30
	same industry	40.6	9.4	31.3	3.1	15.6	100	32
	other industry	3.1	12.5	37.5	12.5	34.4	100	32
international	University	12.9	12.9	22.6	6.5	45.2	100	31
	technical college	0.0	3.3	33.3	10.0	53.3	100	30
	same industry	35.5	12.9	22.6	6.5	22.6	100	31
	other industry	3.2	9.7	29.0	12.9	45.2	100	31

Source: own survey.

Additional insights derived from a distinction between geographical locations (see Table 4) go fairly well in line with our expectations based on the theoretical discussion on the context dependency of certain skills and the universal nature of others. Comparing the relative importance of labour flows

stemming from different spatial levels, we observe that firms attribute more importance to the regional and less to the national or international level. A large share of the interviewed firms consider other companies in the same region and industry as most important source for the recruitment of highly skilled labour (64.7%). In contrast, many firms regard foreign universities (45.2%), technical colleges (53.3%), and other industries (45.2%) outside the country as very little important. Taking the variable 'recruitment from companies in the same industry' as an example, we observe that 64.7% of the interviewed firms consider the region as very important, while 40.6% do so for the national and 35.5% for the international level. We conclude that the regional milieu plays a major role for supplying the moving media industry with highly skilled labour. Competences that are needed to create new or improve existing products and processes in the media industry have a strong localised nature; they barely cross sectoral and regional boundaries. Therefore, labour flows occur mostly between companies that are part of the moving media industry of southern Sweden.

Knowledge sourcing through collaboration

Bilateral *collaboration* is the most fundamental way of gathering knowledge for symbolic industries. It encompasses various types of knowledge that are exchanged between actors through an intentional process of direct interaction. This can be both technological knowledge required as direct input in the development of new or improved products and processes, and knowledge about new trends and developments on the market. It is, as already discussed, reasonable to expect geographically dense local networks, especially between the moving media firms and their customers. As regards suppliers involved in the exchange of knowledge one could expect somewhat more geographically distributed networks, partly because these can be assumed to supply the companies with more universal (i.e. less context dependent) knowledge than the customers, and because they may serve as crucial sources of knowledge for firms aiming to enter new, international, markets. For the same reason one could expect knowledge exchange between moving media firms in Scania and competitors to be more internationally oriented.

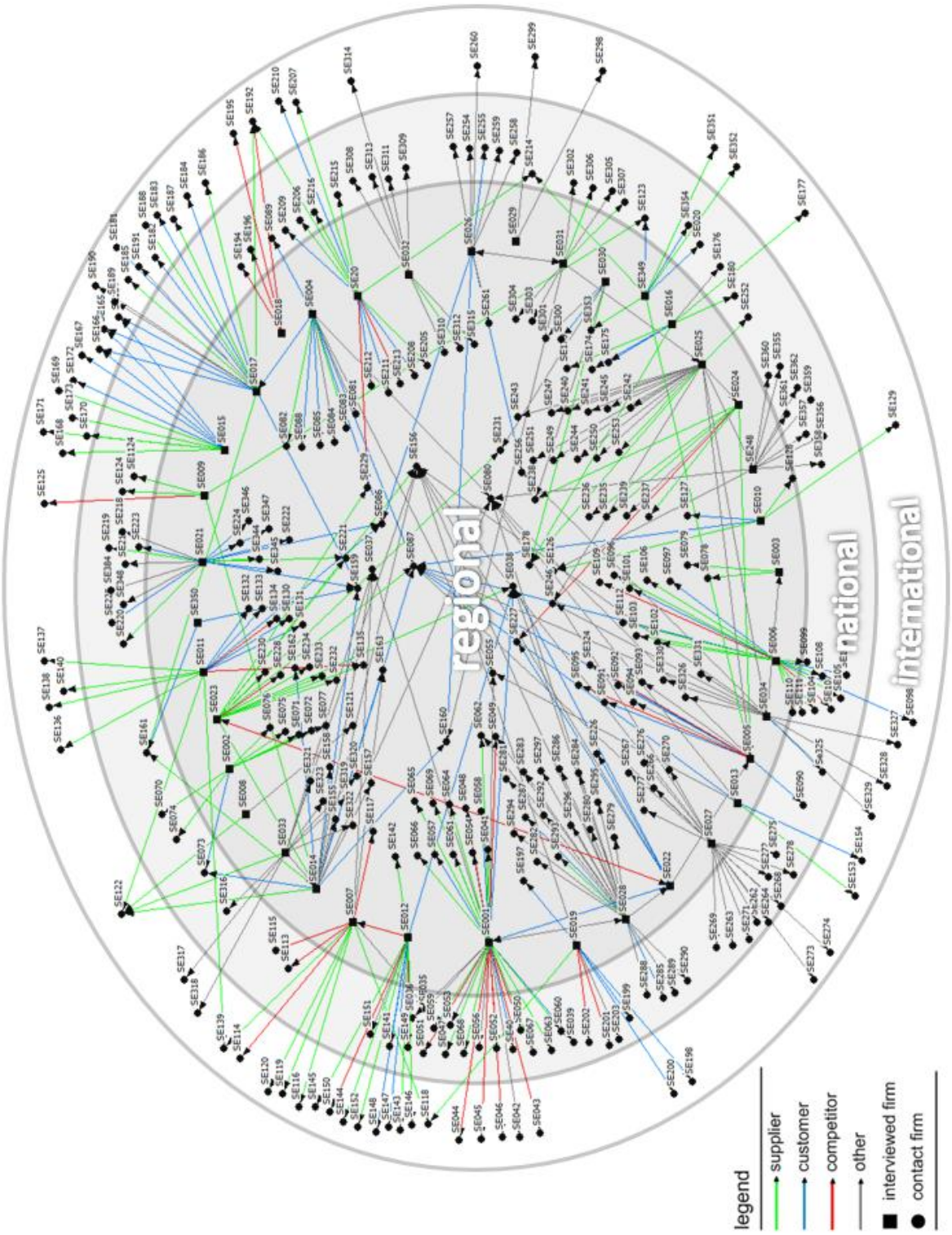

Figure 1: Knowledge flows through collaboration. *Note*: The network is composed of nodes and links. Nodes represent actors, links represent knowledge flows. The node shape indicates whether the actor is part of the interviewed group. The link colour indicates the type of relation (supplier, customer, competitor and other companies). The node location reflects the spatial dimension (regional, national, international). *Source*: own survey. Graphical illustration inspired by Plum and Hassink (2010).

Figure 1 visualizes knowledge sourcing through collaboration. Taking a look on the *structure* of the network, some characteristics of the moving media industry become clear. The network constitutes of a considerable number of actors and exchange relations; overall we count 349 nodes and 403 links. It is obvious that the majority of companies are engaged in intensive exchange of knowledge with other actors inside and outside the region. Almost all firms are part of one single network and either directly or indirectly connected to each other. Exceptions are two companies (SE029, SE032) and their partners which are not explicitly linked to the major network. There are no isolates; all actors are more or less deeply integrated into the network, whereas most firms communicate with numerous different partners.

On the one hand, some firms have a variety of knowledge sources to rely on; they consider a large number of firms to be valuable exchange partners (e.g. SE001, SE028). Those companies rely heavily on collaboration as an essential source of knowledge. On the other hand, some actors are mentioned repeatedly as important partners. These organisations are central knowledge sources and can be considered as key players in the moving media industry. These are foremost the Municipality of Malmö (SE087), Malmö University (SE080) and Media Mötesplats Malmö (SE156), which is an intermediate organisation aiming at strengthening the regional moving media industry. As regards the expected differences between relations with customers, suppliers and competitors, one can see that most of the knowledge flows occur along the supply chain with suppliers (30.0%) or with customers (22.6%). Competitors account for only a small share of all knowledge flows (8.7%) whereas the largest share is other companies that do not fall in the previous categories (38.7%). Going more into details of the network structure, one can see that the majority of firms share knowledge both with their customers and their suppliers (e.g. SE015, SE017). The expected patterns of a larger share of international linkages for exchange of knowledge with competitors and suppliers could not be confirmed.

Considering the *spatial location* of actors and exchange relations, one can see that contact partners are situated both inside and outside the region: out of all 349 actors included in the sample, 51.9% are situated in the functional region of Scania, 28.1% in other parts of Sweden and 20.1% outside the country. We regard Copenhagen as part of the same functional region, since the Danish capital city is only a short train ride away from Malmö and intensive commuting takes place between the two cities. Of all 181 actors considered as part of the functional region of Scania, 16 are actually situated in Copenhagen. Regarding the geographical pattern of knowledge flows, we count 403 links, of which 54.8% occur within the functional region of Scania, 25.3% within the country and 19.9% cross national boundaries. Although national and international linkages are considerably present, intra-regional knowledge exchange is prevailing. This empirical observation is in line with our expectation that knowledge exchange and interactive learning is most effectively conducted though direct face-to-face interaction, therefore firms tend to cooperate primarily with actors located in geographical proximity.

Conclusions and policy implications

In this paper we studied the moving media industry of Southern Sweden as an example for economic activities that are to a large extend based on symbolic knowledge, to shed light on the organisational

patterns of knowledge sourcing in this type of industry and to address the question of whether local or non-local is the main locus for knowledge exchange among firms and relates actors. Aim was to examine the organisation of innovation processes with a specific focus on the geographical distribution of knowledge networks and the distinctive nature of knowledge flows in symbolic industries. The notion of knowledge flows was captured from three different angels: *monitoring*, *mobility* and *collaboration*. Our main finding can be summarised as follows. As regards monitoring, e.g. knowledge sourcing through intermediaries, we found that surveys and scientific journals representing scientific knowledge are considered as less important than more 'informal' knowledge sources such as fairs, exhibitions, specialised magazines and the Internet. As regards mobility of key employees, e.g. exchange of knowledge embodied in human capital, we found that knowledge sources in geographic proximity are predominant. The interviewed firms recruit primarily from organisations situated in the same region. Most important in this respect are not local universities or other higher education facilities, but other firm in the same industry. As regards collaboration, e.g. direct interaction between actors, we found that firms are connected to each other in a dense network. Knowledge flows are very much locally configured and occur above all within the regional boundaries.

These observations are in line with our preliminary theoretical considerations. It lies in the nature of symbolic industries to be highly context-specific, as the interpretation of symbols, images, designs, stories and cultural artefacts is "strongly tied to a deep understanding of the habits and norms and 'everyday culture' of specific social groupings" (Asheim et al., 2007b, p. 664). As Gertler (2008) points out, "the symbolic knowledge embedded within industries such as advertising has been shown to be very highly shaped by its social and cultural context - witness the infamous accounts of how an advertisement that is highly effective in one cultural setting often meets with a very different reception when it is implemented in another market" (p. 215f.). The meaning and value associated with symbolic knowledge can thus vary considerably between social groupings and places. Therefore, knowledge flows are more likely to occur if the involved partners share the same socio-cultural background and are part of the same regional environment, which has been emphasized in this paper. Likewise, our theory led expectations concerning the organisational patterns of knowledge sourcing have been confirmed. Scientific principles and knowledge stemming from universities and other scientific organisations tend to be of minor importance. This holds especially for codified knowledge written down in scientific journals and for other monitoring activities drawing on scientific principles. As it has been phrased by Asheim, Coenen and Vang (2007b): "the acquisition of essential creative, imaginative, and interpretive skills is less tied to formal qualifications and university degrees than it is to practice in various stages of the creative process" (p. 665). What drives innovation in symbolic industries is above all knowledge acquired through various forms of learning-by-doing and on the job training, as well as through face-to-face interaction between firms and other actors in the (regional) industry.

The literature on (regional) innovation policy emphasizes that policy makers should by all means avoid 'one size fits all' solutions and unadjusted copying of role models (Hassink, 2001, Koschatzky, 2009, Asheim et al., 2007a, Tödtling and Trippl, 2005). Instead, innovation policy should take into account the institutional diversity and historical development paths of each region (Johnston, 1992), and be aware of the particular needs and requirements of the local industries (Coenen and Moodysson, 2009). Industries can exhibit very different barriers to innovation. As a matter of fact,

there is no ideal policy model than can be replicated without adjustment, which, to be carefully done, requires a much nuanced understanding of the characteristics of the respective industries. To reach such an understanding, it is necessary to identify the type of knowledge that defines the fundamental basis of the industry's competitiveness, or in other words, its specific knowledge base. Industries that are based on symbolic knowledge will need different policy mixes and measures then those primarily based on analytical or synthetic knowledge. Our finding on the spatial and organisational pattern of knowledge flows in the moving media industry show that economic activities in symbolic industries are very much locally configured and draw on knowledge that is generated at the firm level through learning-by-doing and on the regional level through cooperation and interaction between firms and related actors. Thus polices aiming at networking activities on the subnational level can have a substantial impetus on the development of these industries, if they succeed to create the right framework condition for cooperation and knowledge exchange.

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