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The development of knowledge through social capital in clusters

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ABSTRACT

Clusters – a group of geographically proximate firms- can be the source of competitive advantage both at firm and cluster level. Knowledge, social capital and their interplay have been found to be major contributors to this advantage. However, the dynamics behind, and hence the question how it happens, have received considerably less attention. This project aims address this gap by unveiling the dynamics of social capital through which knowledge is developed for competitive advantage in clusters. Unveiling those dynamics will contribute to theory by exploring how some of the benefits of clustering are created through knowledge and social capital, and hence provide an explanation why clusters exist in the first place.

Key Words: resource based view, competitive advantage, knowledge management, networks

INTRODUCTION

Industrial clusters – a geographically proximate group of interconnected companies and associated institutions (Porter, 2000, p. 254) - have taken a central stage in business and economic literature over the past two decades and there is a general agreement among scholars that location matters for firm competitiveness (Malmberg & Maskell, 1997; Porter, 1996). This observation, however, seems paradoxical. In the age of information technology and new, unprecedentedly fast means of transportation, the importance of geographic location should be dwindling (Maskell & Malmberg, 1999). Yet, a vast amount of empirical evidence confirms that clusters are indeed the source of competitive advantage, both for cluster firms, clusters as a whole, as well as the entire region (e.g.Porter, 1996). One prominent example is the IT cluster of Silicon Valley in California, which has not only brought forward the region, but has also shaped the competitive landscape for IT and computer related products word wide (Robson & Rawnsley, 2001). In addition, at the firm level, scholars agree that firms in clusters can enjoy performance advantages such as increased innovation output and higher sales and profits over firms operating in isolation (Camisón, 2003; Jenkins & Tallman, 2010). Not surprisingly, new clusters are emerging frequently, and governments and policy makers encourage firms to settle in one location, for example by providing substantial financial incentives.

Given this 'success story' of clusters, it is not surprising that the key question concerning how these benefits of clustering can be explained has received much attention. One of the streams of research devoted to explaining why and how clusters can provide such advantages to firms and regions is the

knowledge-based view of clusters, describing clusters as venues of enhanced knowledge creation (Lawson, 1999; Malmberg & Maskell, 2002). According to proponents of this view, the benefits of clustering are largely achieved through the leverage of cluster-specific knowledge resources (Arikan, 2009; Tallman, Jenkins, Henry, & Pinch, 2004). Specifically, close geographic proximity gives rise to cluster-specific knowledge activities, namely the generation of a pool of knowledge to which only cluster firms have access to (Jenkins & Tallman, 2010), as well as knowledge exchange and spillovers between cluster firms (Malmberg & Power, 2005) (For the purpose of this research, the collection of these activities will be considered to be "knowledge development").

Another related stream of research aiming to explain cluster advantages is the social capital concept. Social capital is considered such a relational resource and is defined as 'the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit' (Nahapiet & Ghoshal, 1998 p. 243). Social capital has also been found to be a catalyst for knowledge development. Literature on knowledge persistently recognises that knowledge development is inherently social in nature (Dyer & Nobeoka, 2002). There is much empirical evidence that social ties and relationships are major "carriers" of knowledge and consequently foster knowledge exchange and generation, both in and outside a cluster setting (Nahapiet & Ghoshal, 1998; Vejzagic–Ramhorst, Ketikidis, & Huggins, 2012).. This idea is crucial when looking at knowledge as a driver of competitive advantage in clusters particularly, since clusters , by their very nature, are defined through the various relationship of cluster actors (Brown et al., 2007).

The stream of research exploring knowledge and social capital in a cluster setting is interesting for scholars and practitioners as it explains why clustering provides benefits and hence why clusters exist in the first place. However, while numerous studies offer a sound theoretical explanation as to *whether* knowledge can be developed for advantage (Basant, 2002; Howells, 2002; Tallman et al., 2004) and *whether* social capital is important for this process (Vejzagic–Ramhorst et al., 2012) (to both, the answer is a definite "yes"), the question addressing *how* social capital is involved in knowledge development in clusters, and hence the underlying dynamics, have received considerably

less attention and are the focus of this research project. Two questions will guide this research in order to address this gap.

Research questions

By definition social capital is inherent in relationships (Dudwick, Kuehnast, Jones, & Woolcock, 2006; Nahapiet & Ghoshal, 1998) and according to Lorenzen (2007, p. 801), 'social capital consists of social relations among agents'. When exploring social capital related issues, it is important to consider the actions of those in whose relationship social capital is embedded. Therefore, those actors whose relationships are the conduit for social capital will play an important role in its creation, as well as in its leverage. Consequently, the dynamics of social capital for knowledge development are driven by these actors. Hence, an integral part in addressing the research problem is to identify how the actors are involved. The first research question asks:

RQ1: Which cluster actors are involved in the development of knowledge through social capital?

Whereas the first research question addresses the "who", the second research question aims to explore what is happening between those actors, through their relationships for knowledge development, i.e. the "how". The second question therefore aims to explore the dynamics behind the development of knowledge, i.e. *how* social capital is leveraged. The rationale behind this question is the fact that the mere presence of any resource alone cannot lead to competitive advantage. A resource needs to be put to work in a unique and effective way in order to be leveraged and create benefits (Teece, 2009). Specifically, to explore *how* social capital can be used for knowledge development, the mechanisms and processes, including but not limited to associations, interactions, relationships, agendas and exchanges among those participating in cluster activities, will need to be unveiled (Daniel & Dawson, 2011). The second research question asks:

RQ2: How is the social capital of cluster actors conduit for knowledge development in clusters?

Areas of literature

In exploring the literature, one important theoretical platform informing this research is cluster research. In particular, literature addressing the source, or sources, of the many advantages that

clusters create is considered. Specifically, a particular focus is on the resource based view of clusters. Secondly, this research considers the knowledge based view of clusters, including its precedents, knowledge theory and the knowledge based view of the firm respectively. Social aspects of knowledge are included, in order to reflect the research problem dealing with social capital. A third area of literature is social capital, and, giving consideration to the idea that social capital is a relational resource, the relational view.

LITERATURE REVIEW/THEORETICAL BACKGROUND

Looking at those three areas of literature in isolation would not fully inform the research questions. This is due to the fact that the research problem is derived from the overlap of those three theoretical platforms. In their own right, both social capital and the knowledge based view of the firm have received plenty of attention by scholars, and each have been applied to industrial clusters to explain the value that clusters create (e.g. Arikan, 2009; Pinch, Henry, Jenkins, & Tallman, 2003; Valdaliso, Elola, Aranguren, & Lopez, 2011; Vejzagic–Ramhorst et al., 2012). Further, social capital as a catalyst for knowledge development has been discussed extensively, and it is widely accepted that knowledge is social in nature (e.g.Nahapiet & Ghoshal, 1998). The challenge for this research, on the other hand, is to addresses a gap is in the *overlap* of all three theoretical areas: clusters, social capital and knowledge (Figure 1). From current literature, it is evident that social capital and knowledge do indeed play an important role in the creation of cluster advantage. The question of *how* it happens, and hence the dynamics behind, remain unexplored.

Explaining the advantages of clustering – the knowledge based view of clusters

One important stream of research explaining the advantages of clusters is the resource based view (RBV) of clusters, which extends the "traditional" RBV of the firm (see Barney, 1991; Peteraf, 1993) to a cluster setting. According to the RBV of the firm, the competitive position of any firm is determined by its unique bundle of resources that can be used to generate rents and to create a competitive advantage (Barney, 1991; Peteraf, 1993). Based on that notion, the RBV of the *cluster* argues that clusters create and hold resources and capabilities that are not available to remote firms, and hence offer cluster firms and clusters as a whole the opportunity for competitive advantage

through the leverage of those resources (Hervás-Oliver & Albors-Garrigós, 2007). Whereas the firm specific resources in a cluster maintain their importance for the firms and firm level competitive advantage, the RBV of clusters stresses the importance of cluster-level resources, which are 'the result of the combination and interaction of all the localised elements' (Hervás-Oliver & Albors-Garrigós, 2007, p. 114), embedded in the linkages of those involved in cluster activities (Brown et al., 2007; Steffen, 2012).

The resource based view of the firm (Barney, 1991) further acknowledges that one of the most valuable strategic resources is knowledge, a notion constituting the advent of the knowledge based view of the firm. The value of knowledge as a strategic asset predominantly derives from the existence of tacit knowledge, one of two types of knowledge as described by Nonaka (1994). In identifying those types, explicit knowledge relates to documented knowledge that can easily be expressed and written down (such as instructions, policies, rules, procedures etc.), and thus can be transmitted between people and institutions. On the other hand, there is tacit or personal knowledge, which cannot easily be articulated or imitated. This type of knowledge is context dependent; it must be acquired through learning and personal experiences (Nahapiet & Ghoshal, 1998; Valdaliso et al., 2011). Tacit knowledge therefore is not easily transferred between individuals or firms, so firms holding expert or specialised tacit knowledge can use it as a strategic resource for competitive advantage (Boschma, 2005).

The knowledge based view of the firm assumes that knowledge resources are held by individuals, and are shared between them (Grant, 1997). The knowledge based view of *clusters* extends this idea, stating that knowledge is not only transferred and created between individuals in a firm, but also in a network of many firms, facilitated by close geographic proximity (Arikan, 2009). In applying the knowledge based view of the firm to clusters, Tallman et al. (2004) also describe component and architectural knowledge. Component knowledge deals with specific skills and technologies, which relate to 'one identifiable part of the organisational system rather than the whole' (p.264). It contains both explicit and tacit components and hence can be leveraged for competitive advantage. Architectural knowledge, on the other hand, deals with the cluster as an entire system, i.e. as a whole.

It includes 'complex systems of organisational routines' (Hervás-Oliver & Albors-Garrigós, 2007, p. 114). This type of knowledge is non-transferable between clusters and highly path-dependent (Tallman et al., 2004, p. 264). Only by means of architectural knowledge is it possible to make the pooled component knowledge available and exploitable to all cluster firms, a 'quasi-public' source of competitive advantage (Hervás-Oliver & Albors-Garrigós, 2007). Hence, without access to the architectural knowledge inherent in the cluster, remote firms are unable to obtain and leverage this knowledge.

Social capital and clusters

When looking at either clusters or knowledge literature, the stream of research dealing with 'social capital' has to be considered. The idea behind social capital is derived from the relational view of the firm, an extension of the RBV, emphasising the notion that social networks and relationships are valuable intangible resources in their own right, as they can potentially contribute to competitive advantage, if leveraged properly (Dyer & Singh, 1998).

The distinguishing feature of clusters is the relationships among cluster actors. Social capital is inherently present in inter-firm relationships and hence is a distinguishing feature of clusters. Not surprisingly, studies on the presence of social capital in clusters are numerous, and there is empirical evidence that social capital, as a resource, is a major contributor to cluster success and competitive advantage (Lee, Lee, & Pennings, 2001; Vejzagic–Ramhorst et al., 2012). The idea that social capital contributes to cluster advantage is also consistent with the RBV of clusters: social capital is a relational resource created by the various relationships among cluster actors, which can be put to work for competitive advantage (Lee et al., 2001).

Social capital and knowledge

A vast amount of literature on social capital confirms that it is a major 'catalyst', or facilitator, for knowledge development, inside and outside cluster settings. This notion acknowledges the fact that knowledge in itself, and knowledge development activities, are inherently social in nature (Maskell & Malmberg, 1999; Molina-Morales & Martínez-Fernández, 2007; Steiner & Hartmann, 2006). Social relationships serve as pathways to distribute knowledge between individuals and between firms,

enabling its transfer and its sharing in the first place. Social capital also facilitates and supports knowledge acquisition (Sechi, Borri, De Lucia, & Celmins, 2011). Further, social capital is also inalienable for the generation of new knowledge through learning and recombination (Nahapiet & Ghoshal, 1998).

Nevertheless, to date, literature does not explain how knowledge development through social capital works; this is partly due to 'looseness and unspecificity' of the social capital concept, as well as undeveloped methods for empirical studies (Tura & Harmaakorpi, 2005, p. 1114). Therefore, many studies on the concept focus on the effects and outcomes of social capital when leveraged, rather than on the underlying dynamics i.e. from a processual view point. Consequently, Maurer and Ebner (2006) call for a "dynamic perspective" to explain how social capital can be "put to work", rather than just looking at this intangible resource as being static or examining outcomes, effects and content without considering the dynamic process by which it occurs.

The overlap

Evidently, there is much opportunity to explore social capital from a dynamic perspective. Especially in the field of clusters, there is no study available that tackles specifically the problem of how social capital is leveraged for knowledge development, even though indisputably both social capital and knowledge are present in clusters and major determinants for cluster competitive advantage . This study aims to address this gap by exploring dynamics behind social capital for knowledge development in clusters.

PROPOSITION DEVELOPMENT

The involvement of actors

The first research question addressing the development of knowledge through social capital in clusters aims to explore who is involved. The proposition for consideration is drawn from cluster literature which suggests that actors in clusters are important to define the cluster's borders and to shape the cluster environment. A review of literature reveals that cluster actors are frequently complex entities (i.e. people, organisations or institutions) which are likely to operate at multiple levels in various positions, executing a number of activities, influencing and being influenced by the cluster

environment. Holmén and Jacobsson (2000) refer to the 'level' of cluster actors by dividing them into dimensions on the basis of whether they are individual (people), institutional (governments, universities) or industrial (companies). According to this definition, many other studies deal with actors at the individual level. For example, entrepreneurs in clusters have received attention (Feldman & Francis, 2006), and the importance of engineers has also been stressed (Dahl & Pedersen, 2004). The crucial role of external institutions (e.g. universities) as cluster actors has also been acknowledged (Hervas-Oliver & Albors-Garrigos, 2009). Further, actors have been divided into vertical, horizontal or lateral, referring to whether they are directly or indirectly involved in cluster activities, or take a supporting role respectively (Brown, Burgess, Festing, & Royer, 2010).

Due to the variety of possible actors involved, clusters are also characterised by the diverse relationships between those actors, which can take various forms e.g., technical collaboration, governance roles, or collegial relationships. Social capital, by definition, is embedded in each of those relationships, as actors seek to engage and secure others in their activities. As a result, we propose:

> *P1: Diverse cluster actors are likely to be involved in knowledge development through social capital in clusters*

The dynamics – how does it happen?

Studies on social capital have traditionally examined and confirmed the benefits of social capital to knowledge development (e.g. Yli-Renko, Autio, & Sapienza, 2001), but it appears none have gone as far as explaining how it happens. Consequently, no framework exists specifying the processes and mechanisms of social capital that develop knowledge in clusters. Literature, however, does indicate that the different dimensions, or configurations of social capital have various impacts on knowledge transfer (Inkpen & Tsang, 2005). Therefore, it is valid to propose that the dynamics for knowledge development also arise from those different dimensions. The dimensions of social capital are, however, difficult to identify.

Independent from clusters and knowledge, there certainly is a debate about how to define and operationalise social capital's dimension (Moran, 2005). Nevertheless, there seems to be a general

agreement that any definition of social capital dimensions needs to include both the network and the personal level (Sechi et al., 2011). Inkpen and Tsang (2005) use a framework that adopts this notion, and they specifically apply it to industrial clusters. According to Inkpen and Tsang (2005), social capital in clusters has a *structural* dimension, referring to the cluster members' ties and patterns of linkages, which have been proven to create opportunities for knowledge exchange (Adler & Kwon, 2002). Secondly, social capital in clusters has a *cognitive* dimension, referring to shared goals and culture among actors (Inkpen & Tsang, 2005). Lastly, there is a *relational dimension*, focusing outcomes of interaction like trust, norms and identification (Inkpen & Tsang, 2005, pp. 152-154). Even though Inkpen & Tsang do not consider the precise dynamics, the authors stress that these dimensions are major determinants for knowledge development through social capital to happen in the first place. Based on this notion, we suggest that these dimensions will influence knowledge development and can be applied in cluster setting. Thus, we propose:

> *P2a: Knowledge development mechanisms and processes in clusters arise from the structural dimension of social capital*
>
> *P2b: Knowledge development mechanisms and processes in clusters arise from the cognitive dimension of social capital*
>
> *P2c: Knowledge development mechanisms and processes in clusters arise from the relational dimension of social capital*

This study considers Inkpen and Tsang's (2005) framework over other available social capital frameworks because it makes specific reference to clusters. This is crucial as the relative importance of social capital dimensions varies according to the type of network social capital is embedded in (Inkpen & Tsang, 2005, p. 155). Further, their framework is derived from Nahapiet and Goshal's (1998) study, which specifically looks at the link between knowledge and social capital by addressing whether social capital has a role in new knowledge generation. Therefore, we keep with this idea for the development of propositions rather than choosing a social capital framework that has not been used in a cluster or knowledge context.

METHODS

Choice of methodology and methods

The proposed research is inductive in nature, such that rather than testing existing theories with deductive quantitative research methods, this approach aims to generate a new theoretical understanding of social capital and knowledge development in clusters addressing previous inadequacies. It is therefore appropriate that a qualitative approach be employed (Eisenhardt, 1989). Consequently, this research will use a case study methodology. Supporting this choice, Yin (2009) suggests that the case study methodology is a useful approach when the project attempts to address 'how' and 'why' questions, as is the case for this research, which often require rich description of reflection and experience. Further, case studies are appropriate to study processes that are social in nature and based on relationships, and thus are most appropriate for informing the research problem.

Choice of participants, data collection and data analysis

Two biotechnology clusters, one in Germany and one in Australia, will be studied to inform this research. Indeed, the analysis of two cases rather than one, and across two countries, adds to the generaliseability of results (Eisenhardt, 1989). The objective is to engage at least 10-15 member organisations in each cluster, and identify about 25 participants across them to be interviewed. Knowledge affects all levels of the organisation (Coleman, 1988); however, in order to contribute meaningful evidence to explore the research problem, participants need to be involved in the development of *cluster* knowledge, implying their involvement in firm spanning activities. This criterion will most likely be fulfilled by middle or upper level managers. The biotech' industry was chosen because it is a dynamic and competitive high tech' intensive industry where knowledge is a crucial resource. Thus, this high technology sector represents an exemplary case context for studies aiming to analyse knowledge development and its social implications (Eisenhardt, 1989).

The data analysis process will involve transcription of digital audio recordings. Coding of transcripts will be done using NVivo 10 Qualitative Software. Coding will focus on key themes and issues identified by literature, as well as emergent themes arising from the interviews themselves, which may offer new and unanticipated insights into the knowledge development process in clusters.

DISCUSSION AND EXPECTED OUTCOMES

Contributions

The overall aim of this research is to unveil the dynamics of social capital that support the development of knowledge in clusters, which will provide both theoretical and practical contributions. Looking at the overlap of the three literature areas clusters, knowledge and social capital will contribute to theory by establishing that these three should not be looked at in isolation, but that their interplay needs to be considered in order to understand the advantages of clustering . Further, by considering how the relational view can be applied to clusters, and more specifically, how social capital, a relational resource, can contribute to knowledge development, this research makes a theoretical contribution which further extends the RBV and knowledge based view of clusters. Moreover, social capital and knowledge are recognised as major contributors to the benefit of clusters, and hence are one factor why clusters are an established means of regional economic development and exist in the first place. Consequently, the importance of clusters as a tool for economic development adds to the significance and the value of contributions of this project.

Outcomes of the research will also inform practitioners. Social capital is a valuable tacit resource; yet even though it is understood to contribute to the development of knowledge and ultimately to competitive advantage, many practitioners find it hard understand how it can actively be leveraged. This is due to the inherent "fuzziness" surrounding the concept and the lack of operationalisation frameworks (Vejzagic–Ramhorst et al., 2012). Nevertheless, the need to manage it effectively is undisputed (Luthans & Youssef, 2004). Managerial implications can be drawn from the mechanisms and processes explored in this research project, as it will show managers the means by which social capital is supported and thus how it can *actively* be put to work.

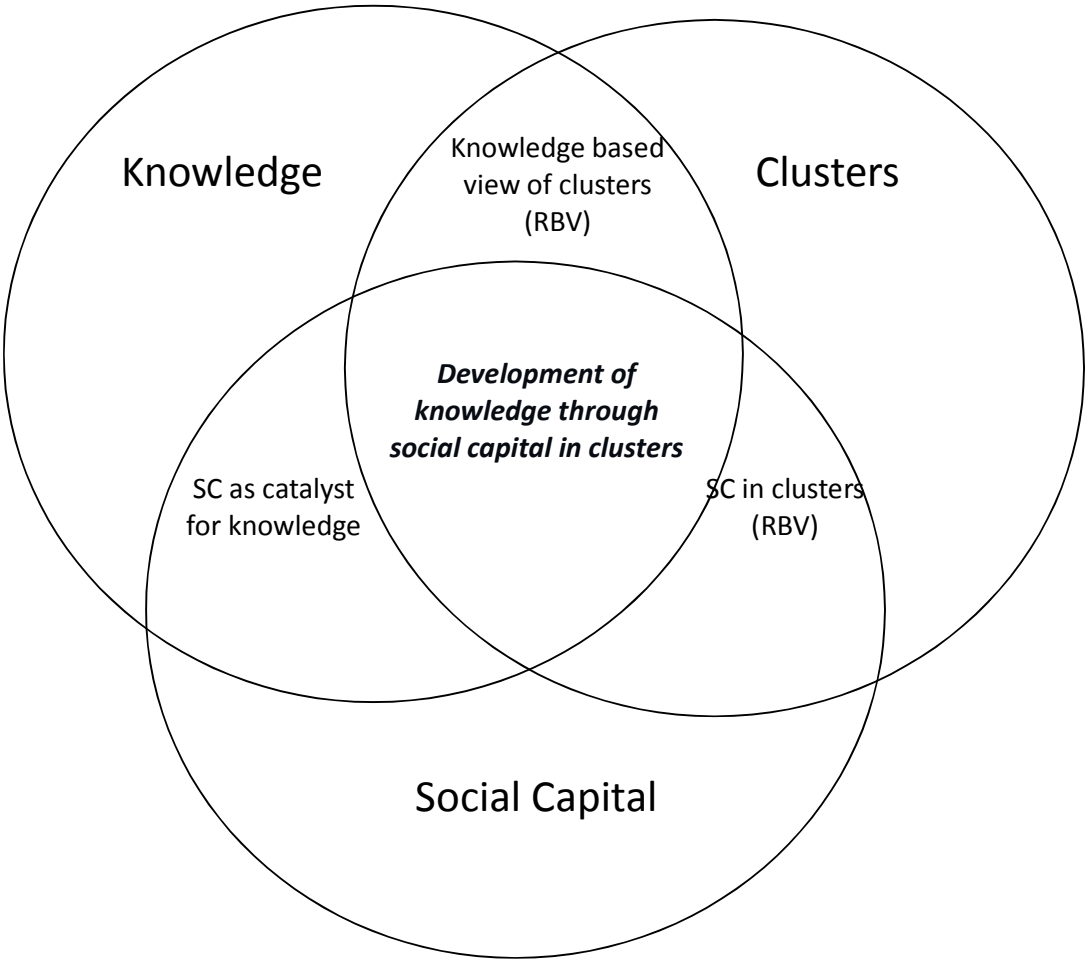
Limitations

A limitation of this study that has to be considered is generaliseability. Results may not be applicable to industries other than biotechnology, or to industries which are not as knowledge based. Further, results may not be applicable to countries other than Germany and Australia, where evidence will be collected. Even though both countries are developed countries and the clusters examined are similar

in terms of industry and size, cultural variables may influence results, especially considering that data is collected via interviews. Hence, accounts of participants may be influenced by their cultural background. Further research on the topic can tackle these limitations by investigating other industries, including low technology, by including other countries in the data set, and by controlling for country-specific cultural variables.

TABLES AND FIGURES

Figure 1 – Theoretical model



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