KNOWLEDGE AND LEARNING IN CLUSTERS AND NETWORKS

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ABSTRACT
Understanding knowledge process in clusters and networks involves combining competence analysis and setting up an appropriate management perspective. The first term includes innovation and learning while the second involve relational risk management. Constructivist vision of knowledge assumes the existence of a cognitive distance between organizations within a cluster or network as they develop a set of cognitive structures while carrying out various tasks, hence they will think (perceive, interpret, explain, evaluate) things differently. In the context of knowledge based management, the goal of new inter-organizational relations between actors within a cluster, in addition to the traditional ones, becomes coping with the need to compromise between organizational identity and internal competences. In learning and innovation within the interaction between these organizations, cognitive distance determines both opportunities and problems. This article analyzes, from a theoretical perspective, the value of innovative cognitive capacities of partners within clusters and networks, from knowledge management and learning perspectives. We conclude that although familiarity promotes reliability, this may reduce the potential for organizational learning.

KEYWORDS: *knowledge, knowledge management, clusters and networks, networks*

JEL CLASSIFICATION: *M10, M15, D8*

1. INTRODUCTION

Clusters are often associated with the concept of network. Network is more general and does not necessarily involve local ties, a common goal or a certain market like clusters does. Specifically, a cluster is a network, but the reverse is not always true. Often, however, theories related to networks are true for clusters, too.
According to Rosenfeld (1996), clusters are "geographic concentrations of similar, related or complementary businesses equipped with active channels for transactions, communications and dialogue that have specialized infrastructure, labor markets and common services and facing the same threats and opportunities".
Most scholars emphasize the importance of intangible resources such as quality of relationships between organizations, trust or networks making up various clusters. Regions providing these factors are internationally competitive and more technologically dynamic than others. Enright (2003) has proposed a scale for classifying clusters:

- The first step is *functional clusters*, made of organizations that achieve and exceed targets; they are aware of their interdependence and produce more than any given organization taken individually;
- The next step is *latent clusters*, not fully realizing their goals; opportunities exist, but potential synergies are not exploited;

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• The last step is *potential clusters*, in which case some of the requirements are met, but some key conditions or resources are missing.

The difference between these three types of clusters lies in awareness of the communion of interests, the range of services and facilities available to specific clusters and organizations as well as the synergy between its members. All this suggests that policies to encourage clusters should not be focused on helping individual organizations, but on fostering and strengthening relationships between organizations in order to promote the synergy between them, making the cluster efficiently from a functional perspective.

2. DISCUSSION

Clusters are dynamic systems that evolve over time. It is necessary to pay special attention to this dynamic due to both the accelerated pace of scientific research and the effects of globalization. In this context, they should pay extra attention to continuous learning and how they approach knowledge generated from every member of the cluster and from the cluster as a whole.

Knowledge flow between organizations should not be always associated with a specific location, can also be found within "communities" more or less virtual, in which case it owes its existence to the means of communication (Ceptureanu, 2016). Moreover, due to the different stages of learning and innovation, links between organizations have different characteristics: in the early stages there may be a greater need for connections locally, while for later stages, this need declines to allow intensification of innovation. Also, dynamic clusters are important from the point of view of public policies. The purpose, structure and performance of cluster are largely dependent on specific, local conditions and are a consequence of historical socio-economic development of the region. This may prove problematic if the intention is to transplant successful models of learning and knowledge transfer from an institutional context to another. As a result, there is no pattern for clusters generally available.

For knowledge transfer among member, three types of connections are of interest:

• Connections with institutional structures;
• Structural connections;
• Inter-organizational (or relational) connections.

The first type of connections derived from geographical location of organizations; the second derives from social networks. Structural features of clusters are size (number of participants, or "nodes"), density (number of direct connections between nodes expressed as a ratio to the maximum possible number), centrality and stability of the structure (rate inputs and outputs). Regarding inter-organizational connections, a related concept is "bond strength". As a result, understanding clusters require a combination of the three types of connections: institutional, structural and inter-organizational.

Also, knowledge and understanding clusters involve a combination of competence and leadership perspectives (Williamson, 1999; Nooteboom, 2004). The first term involves innovation and learning, and the second relational risk management, based on inter-organizational ties (mutual understanding), structural links (reputation) while others institutional links (contracts). Confidence may be based on both the institutional links (values and norms of behavior) and on the inter-organizational links (custom trust).

In cluster analysis are also used concepts of "exploitation" and "exploration", referring to the first effective use of existing resources, and the second to develop new capabilities. Usually begins by exploring innovation after advancing to exploitation.

Concerning clusters competence we must question diversity as a condition for learning and innovation. Typically diversity is associated with the number of people or organizations that are involved in a process of learning and innovation. In addition to the number of organizations involved, another dimension of diversity is the degree of differentiation in terms of skills and

knowledge. This leads to "cognitive distance" concept which is based on a constructivist vision. Constructivism means that if there is knowledge, they give rise to action and action builds or rebuilds knowledge. Hence the terms "experiential learning" and "theory of action".

Constructivist vision of knowledge implies a cognitive distance between organizations as they develop a series of cognitive structures. While they are carrying out various actions these organizations will start to perceive, interpret, explain or evaluate things differently. Main task of cluster entities, in this context, is to reduce these distances through a cognitive epistemological and moral focus, in order to achieve that common goal. There is a noticeable difference between overcoming and reducing the cognitive distance, similar to differences between empathy and identification. Empathy implies capacity to understand, to the extent that this is necessary for effective communication of what others do or say, while identifying involves communion of thinking. The organizational ability to focus is closely related to its absorption capacity. Hence the goal of a new inter-organizational relations, in addition to the usual ones: organizations need to compromise between their identity and internal competence. This vision of the organization shows that it has a mechanism focused attain its activity and is closely linked to the concept of organizational culture, relying on basic categories of cognitive traits characteristics of personnel, knowledge and relationships within it. Perception mechanism focused organization that can have implications for the cluster concept. One of the defining features of clusters is that they also involve an organizational culture shared by everyone in the organization.

In learning and innovation within the interaction between organizations, cognitive distance determines both opportunities and problems. The opportunity is expressed through diversity: innovative value of a relationship increases as cognitive distance increases. In any case, mutual understanding (absorption capacity) decreases with diminishing cognitive distance. It can increase the capacity of mutual understanding but this involves an investment (through innovation) in relation to some specific measures, which means that the link between organizations must be sufficiently long to cover that investment. This means that, especially for knowledge exploration, where knowledge is new and mutual understanding is not granted, the bonds must be strong enough to make possible investments. Among organizations find each other will grow, regardless of the starting point, while the cognitive distance will decrease in direct relation to the intensity of the interaction between them, and more so if this interaction is exclusive. This reduces the value of innovative cognitive capacities of partners, which implies a reduction in performance and learning. This suggests that although familiarity promotes reliability, it may reduce the potential for learning, which means that if it is desired sharing of knowledge, they must not be too strong or too close in terms of time. So, besides the notion of distance cognitive optimal there is the notion of lasting optimum connections for learning: they must be sufficiently long in order to establish mutual understanding and trust, but not so long as to exhaust all learning resources.

An important role in the functioning of clusters is their leadership which involves, among other things, relational risk. In the case of inter-organizational linkages, risk came from addiction that arises as a result of inter-organizational specific investments, defined as investments that have value only (or mainly) in a given relationship. Hence, when such a relationship disappear, organization should invest again in another relationship. To make these investments have the relationship that would hold enough to last and be intense enough - in terms of frequency of interactions to allow recovery of investment. Relational involves risk from an organization tend to take existing values in other organizations that collaborated before, and risk that may occur as a result of structural links. In this case, it links an organization's business community due to coercion or threat of coercion from community members and because of the need to maintain social legitimacy. Risk relational longer arise as a result of institutional links. In this case, the organization is stuck in local obligations of loyalty and compliance, as well as due to lack of cognitive distance "group-think". Specific investments clusters may be incurred as a result of the need to fix the position of each

within the network to position reputations in the local system and the social foundations of trust, in order to gain social legitimacy.

Links with other organizations allow access to a variety of knowledge but also the risk that the knowledge which form part of the core competencies of a company that constitutes the competitive advantage of it to be used in competition or in direct contact (the case of inter-organizational links), or indirectly, to another area of the network, after a succession of direct contacts (the case of structural links). This risk depends on the density of the network. But the risk becomes a serious threat only when losses exceed knowledge volume gains and depends on how that knowledge is tacit or formalized as the formalized documents are more at risk. The risk also depends on the ability to absorb potential competitors' actions, namely their ability to grasp and implement this knowledge. It depends on the cognitive distance between organizations, differences in their abilities to sense, understand and evaluate relevant phenomena.

Exploitation of knowledge in clusters and networks relates to the efficient use of existing resources and capabilities as a form required for short-term survival. On the other hand, the development of new capabilities (exploration) is necessary for long-term survival. Therefore, to survive on both the short and long term, organizations need to find a way to combine them, which is a difficult task. Exploitation often involves maintaining a stable organizational structure, with clear, unequivocal standards, narrow focus, while exploring implies the opposite: weakening structures to allow new reconfiguration, changing meanings and deviations from existing standards within a wide field of focus.

A key issue is how exploration can be used for learning, which is important when learning is based on practice. Another problem is how to ensure the use of exploration outcomes. A possible solution would be "heuristic cycle of development" proposed by Nooteboom (1992), a cycle comprising a series of steps which alternates variety of content with diversity of context. In the beginning, the variety of content (a concept or a concrete fact) resulting from knowledge exploration is low due to the phenomenon of consolidation.

In time, while the focus on exploration decrease, exploitation will be emphasized, making possible a new variety of application contexts, in generalizing. These new application contexts can be sought voluntarily by the expansion of the business. New applications of existing voluntary capacities appear to be the result of instinctive decisions known among psychologists as the "exaggerated trust". In economics, there is also the pressure of expanding markets, while the original normal growth markets stagnate. With the entry into new markets, organizations need access to broader distribution channels, being forced to adapt their products, which involve a number of external knowledge. For clusters, this can occur due to the expansion of multinational companies. As a result, there are three reasons for cluster members to shift from exploration to exploitation. The first is that all existing capacities are formed and consolidated in a particular niche market in which work well and are regarded as self-evident, so new conditions of technology, application, infrastructure and inter-organizational need for to get a better perspective in terms of validity. The second reason is the need to build an important perspective on the goals and motivations for change, resulting from adjustments to the new context. The third reason is as deep understanding of the potential of the new environmental requirements.

The difficulty of combining knowledge exploitation with exploration, in terms of differentiation, depends on three structural features that can be applied to both its member and cluster as a whole:

- *Structure complexity*, defined as the number of component activities and density of direct ties between them.
- *Modularity of the system* based on the exploitation constraints concerning activities, together with generating dependency links.

An important role in for links between clusters it has characteristics of component organizations. This raises the question: how large must be structures of exploitation and exploration? In this case, the size of the structure to be analyzed, which expresses the number of entities and network

connections built (variety) and cognitive distances of connections. Another feature of the network structure is stability, which has direct implications for how it evolves over time on entry and exit of new members. The high stability can be good for mutual trust and efficient exploitation, but not as good for exploration. It also can recall another feature of structure-centrality networks that can be of many types. for clusters, the focus is on the degree of centrality, which is how some nodes have more connections than others.

Force links within clusters is expressed by Bogenrieder & Nooteboom (2004) in seven items. The first four arising from jurisdiction and the last three are related to driving. These dimensions are:

1. Scope, defined as the range of activities related link;
2. Investments necessary to achieve collaboration and overcoming cognitive distance;
3. Frequency actions;
4. Duration links.
5. Control the opportunity to achieve shares;
6. Control incentive through addiction and reputation;
7. Trust and collaboration between organizations.

According to Szulanski (2000) key factors influencing knowledge process in clusters and networks are *knowledge characteristics, disseminative capacity, absorptive capacity and relationship characteristic between senders and recipients*, while Minbaeva (2007) argue that, although these factors are important, characteristics of senders and recipients are more important.

In our opinion, the most important are:

a) Absorptive Capacity. This is defined as "the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends is critical to its innovative capabilities" (Cohen and Levinthal, 1990). Various scholars (Szulanski, 1996; George et al., 2001) consider that recipient organization absorptive capacity is critical to an effective transfer of knowledge. Hence, the ability to identify new external knowledge sources and create/enable mechanisms to bring it to the organization efficiently becomes a source of competitive advantage. However, developing absorptive capacity represents a significant challenge to most companies, and it involves creating and fostering 4 organizational issues: language, base knowledge, process, and problem solving.

b) Causal Ambiguity. This is defined as as the lack of understanding of the linkages between actions and their results in this context (Ambrosini & Bowman, 2010). Firms might be able to perform tasks relatively effectively, but that does not necessarily mean that the impact of a given action is known completely by the actors or observable to an outsider (Lakshman, 2011).

Scholars argue that causal ambiguity negatively affects knowledge transferability. For example, Szulanski (1996) argues that it would increase the eventfulness of transfer especially in the initial stages of the process while Simonin (1999) consider it is harder to transfer causally ambiguous knowledge. On the other hand, causal ambiguity can inhibit replications of valuable competencies by other firms and therefore protect competitive advantage (Wilcox-King & Zeithaml, 2001).

For Loebbecke and others (1999) external knowledge transfer is influenced by synergy, versatility and reverse negative impact.

c) Synergy occurs when additional knowledge is generated by knowledge transfer between organizations, greater than the contribution of each organization. In other words, the cooperation will give rise to knowledge more valuable than the sum of knowledge. The concept of synergy is associated by some authors with the idea of interdependence. It should be noted that synergy occurs only if all organizations involved can and are willing to transfer knowledge.

d) Versatility is the potential of an organization to increase its value by exploiting knowledge transferred from other entities, beyond the limits of their cooperation. Going beyond their alliance, organizations will create value by applying knowledge learned from their partners. Value created depends on the learning capacity of the organization and synergies with the organization's own

activity. Access to knowledge is open to all cooperating organizations and therefore everyone can benefit from the knowledge versatility (Brandburger & Nalebuff, 1996).
e) Reverse negative impact is the decrease in value for the organization who transfer knowledge due to its use by the receiver organization. This does not necessary mean an intended negative action from the receiver organization, it may result independently of the will of involved entities, but still it has a negative outcome for some of the organizations involved in knowledge transfer.
When synergy is low and versatility is high, interest in knowledge transfer is low. Ideal situation is represented by a high degree of synergy (all companies involved in knowledge transfer gain) and a low level of versatility (there is small risk that partners achieve additional benefits from using transferred knowledge in different contexts).

3. CONCLUSIONS

Given the informational nature of the current economic paradigm, knowledge process in clusters has been studied intensively over the past decade and is considered significant in shaping business relations in terms of knowledge between companies (Ceptureanu, 2016).
External knowledge transfer relations leads to a paradox:

- According to the resources based theory, holding intangible assets like knowledge, difficult to imitate by competitors, is the source of competitive advantage;
- According to cooperative competition paradigm (Dagnino & Padula, 2012), interdependence between organizations and knowledge sharing will help them deliver superior benefits.

Knowledge is a source of competitive advantage, and cooperation through sharing of knowledge between organizations has the potential to increase the knowledge base of each partner and consequently their overall competitiveness.
Generally speaking the external knowledge transfer across organizational boundaries is difficult. There are many reasons e.g. 1) organization's expertise may be better than in another organization 2) the diversity of capabilities, culture, structure or technology 3) intrinsic difference in the experience of knowledge transfer (Minbaeva, 2007). The same factors affect both the external and internal knowledge transfer. Transferring is possible only if there is a close relationship between the sender and the recipient: communication bridges, debates over the possibility of the organization hierarchy, the opportunity to team learning and the opportunity to get the organization to learn and share knowledge (Argyris & Schön, 1996).
The purposes of firms are to obtain tacit knowledge which usually related primarily to hiring, research and development cooperation as well as informal networking. Particularly the interaction between the sender and the recipient is the key mechanism for external data assimilation and transfer (Malecki, 2000). The rapid development of communication tools has reduced the companies and their various organizations needs to physical interaction (Howells, 2000). Advanced techniques and technologies enable more and more as the transfer of explicit knowledge, such as tacit knowledge, codification, and thus the transmission from one place to another. The intangible nature of knowledge transfer causes many problems and important aspects. Transfer aspect shows e.g. problems with tacit knowledge, problems with organizational culture and problems to understand the importance of interaction and motivation. Looking at the firm´s aspect there seems to be the similar domain knowledge, similar structures and systems, experience, ability to use new knowledge and time dimension to transfer. The relation aspect consists of social ties and trust between sender and receiver.

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