

The Ba Cluster : Inter-organisational and Co-evolutive Platform for Knowledge Creation

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Abstract. This paper adopts an evolutionary framework and focuses on inter-organisational interactions in terms of knowledge creation. More precisely, it is based on the pro-active theory of the knowledge-creating firm which views any firm as a continuous spiral of knowledge conversion throughout organisation. This spiral can only start when individuals and groups share a context, a “ba”. The most important component of “ba” is interaction; indeed individuals crystallise and transcend their knowledge in this interactive space. (see Nonaka, 1991 ; Nonaka and Takeuchi, 1995 ; Nonaka and Konno, 1998 ; Nonaka and alii., 2000) The paper discusses and develops the concept of “ba-cluster” in a similar logic than “ba”. Indeed, the “ba-cluster” represents the inter-organisational platform for knowledge creation and the co-evolution (see Nishiguchi, 2001) of a part (not all) of the knowledge-creating firms. The “ba-cluster” is not the core of knowledge transfers and arrangements, it represents the foundation of inter-organisational knowledge creation. In other words, the “ba-cluster” is the external structure additional to the internal structure viewed as a dynamic configuration of “ba”.

Keywords. Knowledge creation, clusters, inter-organisational interaction, co-evolution.

JEL Classification. L2, O3.

I. Introduction.

“ Nothing endures but change ” (Heraclitus) and change is the only true constant in society. This claim appears justified in light of the economic and social history, especially with regards to the last past ten years and probably to the years to come. The world is changing and the current period is storm advice ! These changes have affected, are also affecting and will affect the economic, technological, political and social climates around the world. They have been discussed extensively in the popular press and/or the academic literature. The constant characteristic of any socio-economic revolution is the emergence of strong uncertainty, with serious issues concerning the post-modern world. Thus, so many questions remain about decisive evolutions : international

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context, European construction, macroeconomics policies, future rate of growth, unemployment... and more especially who-where will benefit of the fruits of growth in the next years¹. The previous questions and other ones reveal how the bounds of probable future are difficult to draw.

However, as we enter the 21st century the fronts of change appear to be as persistent as ever. It is commonly accepted that the information and the knowledge in the global network society has quickly replaced the physical capital in the industrial society. All actors will be confronted to major changes : change of geographic area, change of technological era and change of consumption air. While this view is generally accepted, the situation is not necessarily the same as regards to the content of the information and knowledge in the global network society. What are the new operational rules in this turbulent environment? Briefly, the main characteristics are uncertainty, complexity, specialisation, need to transversality, rapidity, high quality, continuous organisational innovation, skills, expertise, knowledge, information, etc.

The dramatic development of information and communication technologies (ICT) over time has generated available information flows unknown in the past. Some discussions have often used the terms information and knowledge independently one from another, however a distinction exists between them. "Information is a flow of messages, while knowledge is created by that very flow of information and is anchored in the beliefs and commitment of its holder" (Nonaka and alii., 2001). These differences have been discussed and presented in reviews as the *Industrial and Corporate Change* (2000) and the *Revue d'Economie Industrielle* (1999). Two arguments are crucial. Firstly, even if the ICT have increased the codified knowledge, they haven't been without consequences on the internal organisation of the firm, especially on the knowledge creation, as well as tacit than explicit; consequently, the growth of knowledge codification can come (in part) from the growth of tacit knowledge. Thirdly, when information is essentially a technological process, knowledge is essentially a social process. Thus, "we especially stress the cognitive and organisational mechanisms mobilised by the codification process. Indeed, if economies do not consider these mechanisms (that are usually studied by other disciplines such as psychology), there is a risk of misinterpreting some key aspects of codification knowledge" (Ancori and alii., 2000).

¹ Indeed, not only the growth is not homogenous everywhere and for everybody (see François Perroux, 1961, *L'Economie du XX^e siècle*, PUF) but also any revolution generates its set of inequalities, the paces of change and adaptation being different across individuals and across spatial place. The result is then the economic and social desorganisation, as Karl Polanyi (1944, *The Great Transformation*) has seen it for the industrial revolution.

The paper focuses on the knowledge-based and the learning-based economy. “If knowledge does not change, then how an economy ever grow?” (Potts, 2001) The knowledge and the learning are the main sources of sustainable competitive advantage and growth of firms and more especially their creation and their valorisation. Nevertheless it does not forget that “economic evolution proceeds by the creation, maintenance and destruction of connections as the growth of knowledge, which is what Joseph Schumpeter said, and economic growth is then proportional to the frequency of actualisation of this knowledge” (Potts, 2001). So, considering the short-lived nature of knowledge, firms cannot be satisfied with their present knowledge whereas competitive and technological environment changes. The maintenance and the increase of competitiveness and growth means continuous creation and valorisation of new knowledge for firms. The theory of knowledge-creating firm describes such a process through the SECI spiral (section 2) and the concept of “ba” as a foundation for knowledge creation (section 3).

Furthermore, as the main characteristics of the new era are uncertainty, complexity, specialisation, need to transversality, rapidity, etc. firms have to focus more of their attention on interactions with external partners in innovation. The theory of knowledge-creating firm appears always relevant not only to describe transfer of knowledge across firms (section 4) but also creative transfer of knowledge developing the concept of “ba-cluster” (section 5). The paper presents then the interest of this concept (section 6) before offering few remarks to go farther (section 7).

II. Knowledge creation within firms: the SECI spiral.

According to remarks from Coriat and Weinstein (1995), we consider the firm both as an organisation and an institution. The theory of knowledge-creating firm (see Nonaka and Takeuchi, 1995) enters in this conception, even if we neglect the conflicts issues within and across firms. Moreover, the firm is viewed both as an information processor and as a knowledge processor (Cohendet and Llerena, 1999), but we develop only the second characteristic. The capacity for an overall firm to create new knowledge, to diffuse it within the firm and to incorporate it in its products, processes, services and systems represents what Nonaka and his colleagues name the organisational knowledge creation. This organisational knowledge creation is the key component distinguishing the firms in the domain of innovation. According to the authors, such firms are

particularly efficient in the production of continuous, incremental and in spiral innovations in concordance with the new era. Consequently, the paper focuses on the creation and valorisation of knowledge flows rather than on accumulated knowledge.

The model described by Nonaka and alii. is based on two dimensions: epistemological and ontological. Borrowing from Polanyi (1958, 1966) the distinction between tacit and explicit knowledge, we start to present the epistemological dimension. Tacit knowledge is personal (in the mind), related to a specific context and so, difficult to formalise and communicate. Both cognitive and technical elements compose it. The first is relative to mental models such than schemes, paradigms, perspectives, convictions and points of view; so many elements which help individuals to perceive and define their environment. In other words, what it “is” (the reality) and what it “must be” (the future). The third covers know-how and abilities. According to the works of Polanyi, individuals acquire knowledge through the active creation and organisation of their own experiences. Thus, the knowledge which is explicated in words, numbers, codes only represents the visible part of the global knowledge, the part communicable by formal and systematic language.

The dichotomy tacit/explicit and the growing role given to the codification of knowledge often neglect other modes of knowledge conversion. In the one hand, the dichotomy disappears in an interactive complementarity. In the other hand, not just externalisation (from tacit to explicit) exist, and is often simplified in other respects, but also socialisation (from tacit to tacit), combination (from explicit to explicit) and internalisation (from explicit to tacit) play a crucial role in the creation and valorisation of new knowledge. *Normally, we present here the four modes of conversion.*

Accordingly, the knowledge conversion is more complex than the only use of ICT to transform knowledge into information. The four modes of knowledge conversion are processes across interactive individuals and are activated by dialogue, collective reflection, learning, experience, exchange, share, combination in networks... Moreover, they are complementary and interactive through the ontological dimension: individuals, groups and organisation. Indeed, an organisation cannot create knowledge without individuals and interactions. Thus, organisation crystallises and increases individuals knowledge through the SECI spiral. In other words, knowledge conversion is defined as a continuous societal spiral across individuals and not confined in a single one individual.

III. Knowledge creation within firms: the “ba” as a place for knowledge creation.

The previous (and briefly) presentation is incomplete since an issue stays in stand by: how, where and when the SECI spiral will be activated? As knowledge is intangible, continuously active, without effective (and visible) bounds, and cannot be stocked, then how, where and when the knowledge is exploited, created and valorised? A clear cut difference between on the one hand foundation and, on the other hand favourable mechanisms of knowledge creation must be done.

Nonaka and alii fund their approach assuming individuals and organisations have a potential to evolve not only side by side but also, and above all, together within a process of knowledge creation. And we have argued previously that the four modes of conversion are activated by dialogue, collective reflection, learning, experience, exchange, share, combination, crystallisation, etc. So, the firm needs a place for this. In order to exploit and create effectively and efficiently new knowledge, the firm must polarise individuals interactions in a given space-time. The concept of “ba” presented by Nonaka and Konno (1998) defines such a place². Thus, they add a key-missing concept to their theory of knowledge-creating firm: the foundation of the knowledge creation.

The interactive process finds its origin in the existence of a shared space and context across individuals, which represents the place of collective interaction, exchange, learning, dialogue, reflection, crystallisation, etc. All these mechanisms tangle within this place where knowledge is shared, created, used and valorised. Creating and managing a “ba”, an organisation can then effectively manage the process of knowledge creation. The organisation viewed as a dynamic configuration of a “ba” transcends then the individuals and their bounds; they evolve within this place, make evolve the place and partly co-evolve. In other words, the aim of organisation is not to compensate for the individual bounded rationality but to crystallise creations of individual knowledge thanks to an increasing organisational process. Consequently, individuals interactions do not always generate creation of new knowledge, they can be put in failure when shared place does not exist.

The main characteristics of a “ba” are the following. The “ba” is defined as a shared context within it, knowledge is shared, created and utilised, it represents then a place in the human cognition and

² The concept of “ba” comes from the works of the Japanese philosopher Kitaro Nishida about the key role played by the place in the human cognition and action (see Nonaka and Konno for more information).

action in a given space-time. Moreover, none knowledge creation exist without space, since without insertion in a shared context, all knowledge appear as a simple information. Shared context in a space-time however that in one hand the “ba” can be a mental and/or virtual place as well as physical place, and in other hand the space-time within “ba” inserted hasn’t effective bounds. Finally, the “ba” is fluid, can appear and disappear rapidly and is in constant evolution. In other words, the “ba” works as a platform of creation of new knowledge, and the emergence and the permanent renewal of “ba” is the key to produce the energy, the quality and the place in order to realise individuals and inter-individuals conversions of knowledge and evolve through the SECI spiral.

This concept is not unique as such but more global. “Indeed, several authors show the importance of the context in the creation of individual and collective learning processes in an organisation; in most cases, however, only the favourable or unfavourable characteristics of these mechanisms are examined.” (see Creplet, 2000) We focuses our attention on the routines and briefly describe only the main dissimilarities. Indeed the relationship between knowledge creation and the process of creating new routines is clear. First, Coriat and Weinstein (1995) indicate that routines have not social and historical content, what is crucial in the emergence of a shared context. Second, « Nelson and Winter (1982) indicate the significance of routines in creating organisational inertia and the potential for this inertia to lead to a failure of the organisation to adapt to changing circumstances. » (Cohendet and Steinmueller, 2000) In concordance to the new operational rules in the turbulent environment, the process of knowledge creation is continuously dynamic whereas organisation’s routines are relatively fixed, static or even periodically re-examine. So, the model developed by Nonaka and his colleagues is more proactive (Cohendet and Steinmueller, 2000). As a conclusion we would argue that routines are turned towards the past/present when “ba” is turned towards present/future.

Obviously different kinds of “ba” exist for different modes of conversion: “originating ba” support socialisation, “interacting ba” support externalisation, “cyber ba” support combination and “exercising ba” support internalisation.. *Normally, we present here the different “ba”.* Furthermore, different models of management result in different “ba” with various characteristics, determinants and favourable mechanisms. The model defined by Nonaka and his colleagues appears not at all ideal since different forms and degrees of “ba” exist. Thus, Creplet (2000) indicates many degrees of “ba”, as: generic, specific, dominating or even meta “ba”, and illustrates them with empirical

cases borrowed from Nonaka and alii. (1995). The favourable mechanisms to “ba” emergence are, according to the form and the degree of “ba”, truth, care, autonomy, creative chaos, redundancy, new routines, etc.

IV. Knowledge transfer across firms: the arrangements.

Nonaka and alii. (2000) introduce a “function” of knowledge creation to represent/conceptualise the knowledge-creating firm and the relevant indicator is the (marginal) propensity of knowledge conversion. It measures the proportion of tacit or explicit knowledge flow when tacit or explicit knowledge change of one “unit” or more precisely, the growth of explicit knowledge flow when tacit knowledge increases marginally of one “unit”. The fact that the SECI spiral induces an extension or a reduction of knowledge depends then on the scale of conversion propensity. For example (Nonaka and alii., 2000), in the case where the efficiency of knowledge conversion is high in all dimensions of conversion, then the propensity exceed the unit. Thus, tacit knowledge is effectively used for a new innovation and the conversion spiral is activated as a spiral-up; and inversely. So the main characteristic of a firm is not the tacit knowledge but the effectively use of tacit knowledge within a conversion spiral-up through the ontological and temporal dimensions.

Considering the short-lived nature of knowledge, firms cannot be satisfied with their present knowledge when competitive and technological environment change. The maintenance and the increase of competitiveness and growth means the continuous creation and valorisation of new knowledge for firms. So, according to Nonaka and alii. (2000) a firm exists when its own propensity of knowledge conversion exceeds the average propensity of the set of firms in long period. Furthermore, a spiral-up of knowledge creation is activated within a firm when the propensity is high, e.g. superior to the unit; and vice-versa, a spiral-down is activated the propensity is low, e.g. inferior to the unit.

This paper uses similarly the conversion function to describe the (formal and/or informal) arrangements of knowledge transfer, e.g. the (marginal) propensity of inter-organisational conversion. Then, considering the short-lived nature of knowledge and also the knowledge evolutions with more and more complexity, specialisation, transversality and rapidity, firms cannot be satisfied with their own knowledge. Accordingly, inter-firms relationships are sought as coherent

complement to internal relationships. Moreover, inter-firms relationships are facing same constraints than intra-firms relationships, e.g. the continuously creation and valorisation of new knowledge. So, relationship across two firms exist when inter-organisational conversion propensities across these firms exceed the average inter-organisational conversion propensity in long period.

Many empirical studies, as the geography of innovation, highlight the question of external relationships, especially concerning geographical spillovers of innovative activities (see Feldman and Massard, 2002, for a recent survey). It is obvious that understanding inter-firms interactions demand firstly to understand the organisation of firms. Thus, the mobilisation of external knowledge and their coherence with knowledge developed within firms are relatively embedded and even sticked together (see Bouba-Olga and Carrincazeaux, 2001, for such an example). The seminal works by Cohen and Levinthal (1989, 1990) about the concept of absorptive capacity precise this relationship. The authors assume the research effort of a firm is not only made to develop new process and product but also to maintain and develop theirs capacities to assimilate and exploit external knowledge. Thus the capacity to evaluate and use the knowledge beyond the firm boundaries is largely function of the level of (concerned) previous knowledge. In other words, firms conducting their own research will be potentially better at using external researchers in their innovation process.

The coherence between internal and external interactions and the effectiveness and efficiency of interactions give two characteristics concerning arrangements. Firstly, a relation across propensities of internal and external conversions exist and more precisely, external conversions are function of internal conversion. Secondly, a firm cannot converse more knowledge from other firms than within its own boundaries. Furthermore, inter-organisational interactions must be mutual so that interactive firms are transmitters and receivers of new knowledge, and that conversion relationship can thus continued.

Furthermore, firms are heterogeneous not only in terms of research effort but also in terms of accumulated knowledge and skills (scale), knowledge flow creation (dynamic), organisational configuration and inter-organisational interactions. So firms are distinct as regards to their capacity of knowledge conversion as internal as external. Finally, these characteristics limit on the one hand

the external conversion and on the other hand the number of effective and efficient inter-organisational interactions (as the small worlds system illustrate it³).

V. Knowledge creation across firms: the "ba-cluster".

According to the main characteristics of knowledge-based and learning-based economy, we argue that "ba-cluster" represents the forward stage of arrangements. The concept of "ba-cluster" enlarges the concept of "ba" to inter-organisational interactions, following the hypothesis that an organisation cannot create knowledge which emerges through individuals interactions.

The "ba-cluster" takes same characteristics than the "ba". Thus, it is a shared place, space and context across two or more organisations. Moreover, it is inter-organisational platform for knowledge creation, in constant evolution and without real space-time bounds. Even when arrangements concern a transfer and/or an exchange of knowledge, "ba-cluster" represents a platform where a SECI spiral of knowledge inter-organisational conversion takes place for constituent firms. The "ba-cluster" appears then as the foundation of sharing, creation and valorisation of new knowledge. This place is not pre-existing or pre-supposed, it emerges from the effective and efficient interactions across organisations members, the continuous relationships as arrangements. Finally, the "ba-cluster" represents the place of inter-organisational interactions, learning, reflection, etc. in other words a shared context which transcends individuals and organisations within this knowledge creation process. As previously, different forms of "ba-cluster" exist with various components and favourable mechanisms. Such a cluster is a platform for a bounded number of firm and according to the situation, this cluster has a temporary state or permanent character. Nevertheless it is not a platform for overall firm but rather for a part of it. Indeed, some of its members rather than its totality are constituent of the platform.

To take conversion function in order to conceptualise the "ba-cluster", the first proposition is the following: a "ba-cluster" emerges when propensities of inter-organisational conversion are high, e.g. superior to the unit. Thus, firms are engaged in a inter-organisational co-spiral-up of knowledge creation. In other words, a firm is constituent of a "ba-cluster" when its propensity of conversion

³ See Zimmermann (2001) for a survey and research program and Cowan, Jonard and Zimmerman (2002) for a recent paper.

with one constituent firm is high, e.g. exceed one; inversely, a firm disappear of a "ba-cluster" when every constituent interactions decrease, e.g. inferior to one.

According to evolutionary works every firm needs both an internal and an external organisation (Loasby, 2001). Thus, internal and external structures of a firm are not dichotomous and substitute one another, but rather complementary and interactive. And in the configuration of theory of knowledge-creating firm, the "ba-cluster" can be viewed as the external complement of the "ba", and the firm is viewed as a dynamic configuration of "ba" and "ba-cluster" (more especially an embeddeness of different forms of "ba" and "ba-cluster" with various degrees). One of essential components of inter-organisational platform takes place in the existence of interactions. Assume two organisations relied across them by the existence of such a platform, then these organisations generate through this "ba-cluster", a SECI inter-organisational spiral of knowledge creation rather than a simple transfer. Consequently, we are in front of one conversion spiral for two organisations. Nishiguchi (2001) presents this idea naming such process a co-evolutive creation of knowledge or again a symbiosis across the two organisations: "A new vision will be presented in which these two systems are perceived not as completely separated and independent entities but as constituting a coevolutionary part of a nested structure in which the two systems are dynamically intertwined through entrainment, generating new life of edge of a twisting whole-surface interaction".

The theory of knowledge-creating firm eliminates the dichotomy opposing competition, co-operation or integration. These concepts are always present but the symbiosis idea moderates existing dissimilarities. It is a question of joint evolution within "ba-cluster" of a part of knowledge flow for constituent firms. In other words, a certain level of tangle exist across organisations within this platform. Such a symbiosis is distinct about the idea of conjoint evolution of institutions and knowledge described by routines and quasi-routines across firms (Loasby, 2001). In this vision, existence of strong structure of ties does not mean that potential influence is materialising and consequently it is advisable to know the use that actors do of this existing potential. In the vision of the symbiosis, it is a question not only of share and creation but also of effective use of new knowledge within existing platform. Moreover, the organisations evolution is not joined in the sense that they evolve side by side, that they juxtapose. Here, it is a question of connection of a part of organisations evolution in the bounds of the knowledge creation. The evolution of tangled parts within the "ba-cluster" is unique, and in the contrary case it disappears as rapidly as it appeared, or then it corresponds to a simple arrangement.

In conclusion, the "ba-cluster" does not only generate a dependence relationship of external towards internal framework but also of internal towards external framework in the bounds of existing symbiosis. Finally, the effectiveness and efficiency of an organisation is function in one hand of its own capacities to create and valorise new knowledge and skills and in other hand of co-evolutive firms capacities to create and valorise new knowledge and skills, thus than mutual capacity to construct "ba-cluster" and to renewal it, its configuration, evolution and stability over time and finally the importance of the symbiosis in the knowledge set of firm.

VI. What is the interest of the concept of "ba-cluster"?

Given that the next stages are in the one hand to develop more precisely the different forms, degrees and determinants of "ba-cluster" (including cost of knowledge creation) and especially to analyse "ba-cluster" in a spatial configuration with the question of embeddeness of "ba-cluster", and on the other hand to illustrate this concept by an empirical illustration, we can briefly present several key interests.

Many studies focuses on research effort terms to promote innovation process, nevertheless other components play a crucial role in terms of knowledge creation management (see above). Furthermore, evolutionary approach and french school of proximity emphasise some favourable components for inter-organisational interactions concerning spatial clusters : institutional and organisational proximity (or routines), absorptive capacity, social network, autonomy, connection, etc. (for a survey, see Torre and Gilly, 2000). However, as juxtaposition is not connection, connection is not juxtaposition, and institutional proximity is not interaction, absorptive capacity is not effective transfer, etc⁴, something is lacking. Thus "ba-cluster" appears as missing component to explain effective knowledge creation across firms: emergence of shared place.

Thus, the aim for regional and innovative policies could be to favour the emergence of local "ba-cluster" in order to in the one hand to stick firms and in the other hand to increase knowledge creation flows and growth. Kostianen (2002) offers a first illustrative case presenting some

⁴ Thus, Loasby (2001) argue "increasing returns are returns not to the elements but to the connections between them".

potential “ba” for the development network including practical examples from Tampere Urban Region (located in Finland) in almost similarly logic. Recently, the concepts of “buzz” (Storper and Venables, 2002) and relevant pipelines (Bathelt and alii., 2002) appear as facilitating conditions for emergence of “ba-cluster” with different forms of “ba” generated by different kinds of “buzz” and pipelines (for example local/global).

However, if we assume “ba-cluster” is physical and localised, then a local cluster is probably not equally to one “ba-cluster” but rather to an embeddedness of “ba-clusters” and to certain parts of these “ba-clusters” (as a region is an open system). What is similar to conception of Los Angeles, Silicon Valley or Route 128 not as one cluster but as a network of clusters (see Benko and Lipietz, 1992 and 2000).

Moreover, the concept of “ba-cluster” is in concordance with the turbulent environment and the characteristic of differentiate rapidity. Indeed, according to Cassels (1996) the space of flows has replaced the space of places, and the “ba-cluster” possess both two characteristics: it is a space-place of knowledge flow creation.

As a conclusion, according to a vision of a firm as a dual (but complementary and interactive) framework information processor (bounded rationality) and knowledge processor (embed “ba” and “ba-cluster”), the aim of organisation over time is not to compensate for its bounded rationality or this of members (within social network) but to construct a shared space-place within itself and with other firms for transcend knowledge through a conversion and creation process.

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