Scientific Ethos and Knowledge Management

Constantin Stoenescu
Faculty of Philosophy, UNESCO Chair, University of Bucharest, Romania

constantin.stoenescu@filosofie.unibuc.ro

Abstract: The development of knowledge creation theory (Nonaka and Takeuchi, 1995) took into account the values shared by the members of an organization, later generating an extended concept of "Ba" (Nonaka and Toyama, 2005), understood as shared context. Matsuadira (2010) defined the complex of organisational values (the *ethos*) as knowledge (intangible) assets for knowledge creating companies. I suggest that this leads us back to R.K. Merton's theory of the normative structure of science and the ethos of science. The challenge is to ask whether we can we talk about the applicability of the norms proposed by Merton to the case of knowledge management in knowledge creating companies, or rather there will be some evident deviations and counter-norms. It is well known that the value of universalism is contested by particularism or that of "communism" by the secrecy of research. My hypothesis is that at methodological level the technical norms of knowledge testing and evaluation are universal and globalizable, but in the practical context of the action the guiding values and the mores of knowledge production are local and particular, i.e. depending on various social and cultural factors. The principle of glocalization ("think globally and act locally") should, therefore, be applied.

Keywords: Knowledge creation company, Scientific ethos, Concept of "Ba", Universalism, Glocalization

1. From Tacit Knowledge to Shared Values

Over the past century, the traditional view of knowledge as created by "heroic pure science", i.e. by the scientist isolated in the "ivory tower", has been drastically challenged. While historians of science have shown that the progress of knowledge takes place in relation to the context in the diversity of its social, economic and cultural aspects, philosophers of science have focused on the epistemic relevance of external factors. The decisive turning point was reached by bringing the scientific community to the fore and analyzing the progress of knowledge in relation to the internal interactions that take place within it. The structured scientific communities, understood as groups of professional science practitioners, were "presented as the producers and validators of scientific knowledge." (Kuhn, 1970, p. 178)

However innovative, Kuhn's perspective on the production of organizational knowledge defended in *The Structure of Scientific Revolutions* continued to be based on the Cartesian assumption regarding the distinction between the knowing subject and the known object. It worked with the assumption of a similarity between the case of an individual processing information to solve problems, and that of a scientific community processing information from the external world to solve puzzle problems while doing normal science or, as an effect of some anomalies, understood as adaptive failures to the objective environment, doing extraordinary research. It should be mentioned, nevertheless, that Kuhn recognized the importance of the tacit knowledge incorporated by the paradigm shared by the members of a community working in the same research tradition. At the same time, he insisted on the elements of discontinuity, of a revolutionary type, in the transition from one paradigm to another, without considering the possible deep and innovative transformations within the community.

A new approach to the process of creating organizational knowledge was proposed by Nonaka and Takeuchi (1995) starting from the exemplary case of the company that assumes as an explicit managerial objective to be innovative. The epistemological novelty of this theory consists in emphasizing the decisive role of tacit knowledge in the creation of new knowledge. The upward spiralling process of creating knowledge begins with the mobilization of tacit knowledge and the possibility of converting it into explicit knowledge. This process of mutual transformation of tacit knowledge into explicit knowledge and *vice versa* at various ontological levels - individual, group, organizational and inter-organizational - is the mechanism by which individual knowledge is extended and articulated into and throughout the organization.

Although Nonaka and Takeuchi use the standard definition of knowledge as justified true belief, they do not reduce it, as traditional epistemology does, to propositional or explicit knowledge, i.e. to semantic information only, but rather consider it as a dynamic human process of justifying beliefs to obtain truth. This implies two subjective dimensions, one related to beliefs and commitments related to the epistemic subject, the other to action and intentionality. Therefore, from this perspective, knowledge is not constituted by timeless epistemic entities only. Rather, it is relational and context-dependent. The subjective nature of knowledge is all the stronger at the organizational level as the individuals who communicate and act refer to a system of values that may be the organization's own.

Berger and Luckmann (1966) argued that society is constructed as an objective and subjective reality in the process of interpersonal interaction (both face-to-face and distant). This implies that information is communicated in certain historical situations and cultural contexts that influence personal judgments on reality, individual behaviours and attitudes. Society becomes a subjective reality through internalization, a process which, through socialization, is open to transformation. Society as a subjective reality influences the objective construction of society by institutionalizing and legitimizing certain practices which, in turn, lead to subjective reconstructions. Also, Nonaka and Takeuchi build on Polanyi's arguments (1966) in favour of the importance of tacit knowledge in cognition, especially through the active role it has in the acquisition, creation and organization of knowledge, so that we always know more than what is defined as propositional knowledge. Finally, another precursor is the ACT model from cognitive psychology proposed by Singley and Anderson (1989). It argues that declarative, i.e. explicit, knowledge must be transformed into procedural one, which is the equivalent of tacit knowledge when we consider the acquisition of skills. Nevertheless, despite the significant perspectives they provide, all these theories remain one-sided or partial.

Nonaka and Takeuchi (1995) overcome all these particularities of Western epistemology and offer a general and complete theory accompanied by a dynamic model for the interactions between tacit and explicit knowledge in the form of what they call "knowledge conversion". They claim that knowledge is the product of the interaction between tacit and explicit knowledge in four different modes expressing four possible conversions:

- Socialization: from tacit knowledge to tacit knowledge;
- Externalization: from tacit knowledge to explicit knowledge;
- Combination: from explicit knowledge to explicit knowledge;
- Internalization: from explicit knowledge to tacit knowledge.

Socialization is the process by which individuals share their experience with each other and transmit various mental models and skills without using language, but rather observation, imitation and practice. Since information transfer is not enough to learn a practice, the process of learning from experience is associated with a specific context loaded subjectively and emotionally. This is the only form of interaction able to ensure the transfer of tacit knowledge.

Externalization transforms tacit knowledge into explicit concepts, metaphors, analogies, and models. Since linguistic expressions cannot fully capture the content of tacit knowledge, there remains a gap manifested as inadequacy, inconsistency or insufficiency. However, it is only through externalization that we obtain new concepts, so that we can understand the unknown through the knowledge we already have.

Combination is a process of systematizing concepts and reconfiguring explicit knowledge. Through these orderings of concepts, new knowledge can be produced and new fields of research can be opened. Combination can be understood as a managerial process aiming at adequately ordering and integrating concepts in relation to other theoretical concepts or principles. The decisive role belongs to the so-called middle range theories and concepts that flexibly ensure the relationship between the great concepts or principles and their field of application.

Internalization is the process by which explicit knowledge is incorporated into pre-existing tacit knowledge. Various theoretical advances become practical and are converted into experiences: knowing that becomes knowing how. This process is correctly described by the phrase "learning by doing". Experiences turn into tacit mental models that are shared by the members of an organization, and the organizational culture is reconfigured by assimilating new knowledge.

The model proposed by Nonaka and Takeuchi generated a lively debate between theorists and experts in the field of management. The model was recently confirmed by Bandera et al (2017) in a research applied to small and medium enterprises. Anyway, in response to the various criticisms that particularly targeted the lack of a fine agreement of the model with an empirical basis, Nonaka and his collaborators initiated a review and an expansion of the model by including two more levels of analysis: the context shared by the members of a knowledge-creating organization, and the knowledge assets.

The concept of "Ba", roughly translatable by "place", was proposed by the Japanese philosopher Nishida (1970), developed by his compatriot Shimizu (1995), then applied by Nonaka and Konno (1998) to answer questions regarding the fundamental conditions of knowledge creation, the location of this creative process and the possibility of treating knowledge as a resource. Nonaka and Konno adapted this concept of the common space of the interpersonal relationships dynamics to the knowledge production process and integrated it into the SECI Model. This space is not only the physical one, i.e. workplace or meeting place, but also the virtual one, of remote

communication, or the mental, ineffable one, of sharing ideas, experiences and ideals, as well as anything that combines these elements. We distinguish between two dimensions of tacit knowledge in this common space: the first is the technical dimension, which is usually called “know how”, the second is the cognitive dimension, which “consists of beliefs, ideals, values, schemata, and mental models which are deeply ingrained in us and which we often take for granted.” (Nonaka and Konno, 1998, p. 42)

The four ways of knowledge conversion are redefined from the perspective of the concept of “Ba”. Socialization involves the sharing of tacit knowledge between individuals who interact in the same space and who, without using language, are emotionally prepared to receive it from each other. Relationships between people must be not only of external sympathy, but also of empathy, which presupposes a certain inner state of the self. Through externalization, tacit knowledge acquires a comprehensible form, which means that each individual transcends the limits of the self and integrates into the group, namely, his intentions and ideas merge with those of the group. Therefore, the conversion of tacit into explicit knowledge is not only an epistemological process, but involves self-transcendence and group integration. In this sense, dialogue is both a cognitive process that involves understanding the propositional meaning and an empathic one, in which individuals feel each other as present face-to-face in the group. Combination involves the complex development of propositional knowledge through communication, diffusion and systematization, a process that leads to new knowledge. Nonaka and Konno distinguish between three processes of combination, each associated with certain practices. The first one consists in the capture and integration of newly created knowledge, which involves the collection and ordering of explicit knowledge from inside and outside the organization. The second process consists in the dissemination of explicit knowledge through the direct transfer of knowledge, and the third consists in the processing and editing of explicit knowledge so that it can be used by anyone outside the organization, like a public good. Internalization implies the conversion into tacit knowledge of those knowledge elements that are relevant at the organizational level, so that the individual is again in a relationship with an entity that integrates him. Completing this process involves two practical aspects: "First, explicit knowledge has to be embodied in action and practice. Thus the process of internalizing explicit knowledge actualizes concepts or methods about strategy, tactics, innovation, or improvement. (…) Second, there is a process of embodying the explicit knowledge by using simulations or experiments to trigger learning by doing processes." (Nonaka and Konno, 1998, p. 45)

Accordingly, to each stage of knowledge conversion corresponds a specific Ba. Socialization is related with Originating Ba, an existential level where the individuals interact face-to-face, sympathize, empathize, share their feelings, emotions, experiences and mental models in order to obtain some emerging qualities such as care, love, trust, and commitment that lead to the removal of the barrier between oneself and others. Externalization is related with Interacting Ba, a reflective level where individuals consciously interact peer-to-peer through dialogue to convert individual mental models and personal skills into concepts and utterances with intersubjective use value. Combination is based on Cyber Ba, a systemic level where the interaction is from group to group in a virtual world where new explicit knowledge is combined with existing information so that, in a collaborative environment, it should ensure the logical systematization of cognitive contents with the help of various information processing technologies. Internalization is supported by the Exercising Ba, a synthetic level where, on the site and through practices, explicit knowledge is internalized by the participants who apply it to concrete situations.

The third element of the development of the SECI model, namely, the notion of knowledge assets, after specifying the phases of knowledge conversion and defining the concept of Ba, was introduced by Nonaka, Toyama and Konno (2000). Assets are generally defined as those resources of any organization that are indispensable to creating value. Knowledge itself is a fundamental asset for any organization, and the knowledge-creating process is in turn based on knowledge assets which have to be created, acquired and exploited. All the inputs, outputs and moderating factors of the knowledge-creating process, from informational contents (such as a structured theory) to emotional components of the context (such as trust among members of the organization), constitute knowledge assets. Nonaka, Toyama and Konno (2000) propose to distinguish between four categories of assets: experiential, conceptual, systemic, and routine. Experiential knowledge assets consist in tacit knowledge shared through common experiences (individual skills and know-how, emotional knowledge such as care, love and trust, physical knowledge such as gestures, energetic knowledge such as passion and tension, or rhythmic knowledge such as the ability to improvise and entrainment). Conceptual knowledge assets consist of explicit knowledge articulated through images, symbols and language, but also of their design and the so-called brand equity. Systemic knowledge assets consist of systematized and packaged explicit knowledge, such as documents, specifications, manuals and other explicitly stated technologies or product specifications, databases, patents and licences related to intellectual property rights.

Routine knowledge assets consist of the tacit knowledge embedded in organizational actions and practices such as know-how in daily operations, organizational routines and organizational culture.

This integrative perspective in which the SECI model, the concept of Ba and the concept of knowledge assets merge to explain the dynamism and complexity of knowledge management as an intangible public good or commodity was articulated in details by its authors and underwent a revision by extension. Whereas Nonaka, Toyama, and Konno (2001) offer only a new systematization highlighting the emerging role of Ba and definitively breaking with an individualistic theory of knowledge management, subsequent research by Nonaka and Toyama (2003, 2005) proposes taking into account another level of analysis, namely, that of the values shared by the organization and the general managerial vision. Nonaka and Toyama present a dynamic model of knowledge creating company and describe knowledge creation as a synthetizing process based on certain enablers such as: knowledge vision, driving objectives, dialogue, practice, Ba (shared context), knowledge assets and environment. This revised version explains the differences among the organisations regarding knowledge creation not just as a result of a competitive market but mainly as a result of their strategic vision. The guiding theoretical principle of this approach is that knowledge creation is a dynamic process of interaction between subjectivity and objectivity, a synthesis of thinking and actions of individuals who interact with each other in an emergent organization and also beyond it.

However, a question is necessary: how can the organization as a whole give identity to individuals, motivate them and obtain results at the organizational level transcending the individuals that make it up? The web of relationships in knowledge creation process becomes a very complex one: there are relationships between individuals within the organization and outside it, then there are mutual relationships between individuals and the organization, but also between the organization and the outside environment. What exactly facilitates this whole relationship process and how? What exactly ensures the cohesion of the enablers mentioned above and integrates them into a bundle?

Although Nonaka and his collaborators progressively expanded the subjective dimension of knowledge management, the importance of values structured in an ethos was not distinctly emphasized. Yoshito Matsudaira (2010), starting from a case study on Nissan Company, draws attention to the role of ethos in the production of knowledge. Matsudaira adopts a triple viewpoint – according to the first, the second and the third person – on the knowledge creation process and claims that the ethos as a continued practice guided by an ethical basis founded on reason, becomes one of the intangible assets for all the three managerial categories, namely individual, team and organisation. The ethos enables knowledge creation in the knowledge-based society. It provides the coherence and cohesion of practices and vision, and is, therefore, indispensable.

2. Back to the Scientific Ethos

By adding this normative level of the scientific ethos, the knowledge management theory seems to have become complete. The path taken by the knowledge management theory somewhat repeats the short history of the philosophy of science in the twentieth century when it moved from the linguistic vision of the theory to models that take into account the so-called subjective side of science. We thus return to the ethos of science, a topic proposed by Robert K. Merton (1942). He distinguished between technical (or cognitive) norms and moral (or social) norms. In the case of cognitive ones, Merton mentions two methodological principles, one regarding the adecquacy and reliability of empirical evidence, the other regarding the logical consistency and validity, while in the case of moral ones he enumerates universalism, “communism”, disinterestedness and disinterestedness.

Both types of norms assure the extension of certified knowledge, understood as the institutional goal of science, but they do it in a different way, primarily in terms of their rational charge: “The mores of science possess a methodological rationale but they are binding, not because they are procedurally efficient, but because they are believed right and good. They are moral, not technical, prescriptions” (Merton, 1942, p.118). The principle of universalism guarantees the objectivity of research and requires us to evaluate any scientific result on the basis of preestablished impersonal criteria, first of all, according to empirical observation and previously accepted knowledge, not to any personal or social attributes of the scientist. “Communism” presupposes the possession and free sharing of knowledge as a common heritage. Disinterestedness requires the scientist to remain uncorrupted by subjective motivations and to do science for the sake of knowledge as a member of his community. Finnaly, organized skepticism is defined as the “detached scrutiny of beliefs in terms of empirical and logical criteria” (Merton, 1942, p.126). This means that the producers of knowledge need to be transparent in all their activities, while the users of knowledge have to suspend their judgment until the result are scrutinized according to the institutional accepted criteria. All these norms make up the ethos of science, “that affectively toned complex of values and norms which is held to be binding on the man of science. The norms are expressed

in the form of prescriptions, proscription and permissions. These are legitimatized in terms of institutional values. These imperatives, transmitted by precept and example and reenforced [sic] by sanctions, are in varying degrees internalized by the scientist…. Although the ethos of science has not been codified, it can be inferred from the moral consensus of scientists as expressed in use and wont, in countless writings on the 'scientific spirit' and in moral indignation directed toward contraventions of the ethos" (Merton, 1942, pp.116–117).

The main criticism of these norms was to show that science works according to contrary norms or counternorms. Merton anticipated the counternorms in his paper focusing on how moral norms work as principles against which we may meet deviations. Merton's examples are secrecy as a counternorm for communism and the competition for priority as threatening disinterestedness. Later (1976), he developed the idea of sociological ambivalence, a social phenomenon which results when a person is subjected to more conflicting normative systems and he or she chooses alternatively one of the two systems.

It was argued that the norms proposed by Merton are derived from the standard model of "pure science" and are associated with an inherent rationality, while the *New philosophy of science*, starting with Kuhn, showed that the various commitments of a scientific community are variable and relative. Barnes and Dolby (1970) highlighted the temporality and ambivalence of the norms and values constituting the ethos of science and proposed a deviant viewpoint. Ian Mitroff (1974), who studied the Apollo missions, showed that the so-called counternorms (solitariness, particularism, interestedness and organized dogmatism) are equally strong and claimed that the dominance of one set of norms is situationally dependent. Mulkay suggests that the norms are just a mixture of social, ideological and verbal stereotypes and conventions used by scientists in their relations with outsiders. It is better to conceive of these norms "as vocabularies of justification, which are used to evaluate, justify and describe the professional actions of scientists, but which are not institutionalised within the scientific community in such a way that general conformity is maintained" (Mulkay, 1976, pp.653–654).

However, although these norms are not universal, any community aiming to produce knowledge shares certain values. In other words, it is necessary to share certain values, to base the research on an ethos, but the shared values are context-relative and community-relative. So, if in knowledge management the result reached was that a complete theory must take into account the ethos as a knowledge asset, the immediate amendment, based on the debate in the philosophy of science, is that the correct perspective is a relativist one. How do we then resolve the tension, at least apparent, between the universality of knowledge management as a theory and the relativist consequences of knowledge production practices? How should we understand this simultaneity of two tendencies, one toward theoretical universalization, the other toward practical particularism?

I think that an answer was already given by Von Krogh, Ichijo, and Nonaka (2000) by their definition of knowledge enablers as a set organisational activities which ensure knowledge creation. They offered a list of five key enablers: instilling a knowledge vision, managing conversations, mobilising knowledge activists, creating the right context and globalising local knowledge. All of these enablers facilitate relationship and conversation within organisation as well as sharing local knowledge beyond cultural and geographic organisational borders. The two simultaneous tendencies of universalizing and particularizing (Robertson, 1995) understood as globalization and localization merge emergently in the glocalization process.

3. An Exploratory Conclusion: Glocalization and Knowledge Management

The simultaneous occurrence of both universalizing and particularizing is specific in the case of knowledge management through the interference of two different levels, one theoretically universalizing and another practically particularistic, which are harmonized by vision and ethos, and correlated by the principle "think globally, act locally". This means that the theory of knowledge management, considered through its validity within the scope of universality, is adapted and adjusted to the local context in which managerial practices take into account the local vision and ethos structured at community level. As a result, the theory is relative to the context through its application and is successful only if it is projectable to local parameters determined by locally shared values. The ethos facilitates preferences and choices and reinforces them. Suffice it to think of the so-called McDonaldization: a global fast-food chain offers specific menus depending on the geographical area to meet tastes deeply shaped by local traditions. The menu list is tailored to local customs and preferences. Cultural reflexes, beliefs of any kind and their implicit values become obstacles for any strategy that does not adapt to them. Therefore, the theory of knowledge management manages its own glocalization in order to be efficiently applied to the contextual needs structured around an ethos which precludes non-conformities.

The differences between the global and the local are not essentialist polarities, so that globalization would only produce homogenization and lead to the loss of local identities. On the contrary, it is about simultaneous

divergent trends that do not annihilate each other, but develop each separately in their interconnectedness. The concept of glocalization pays more attention to this relationship of connectivity and in this way proposes a new perspective.

Thus, if we analyze the way in which the flow is assured by different innovation systems, we realize that the possibility to use knowledge according to subjective aims and the capacity to use them depends on different cultural, institutional and organizational factors. Vaniscotte (2001) proposed a typology of innovation and educational systems. In Europe we have the Anglo-Saxon model, the Nordic model, Rhine-Danube model and Club Med model. The first innovation system is liberal, innovative, with a strong mobility. At the educational level it is decentralized, selective and unequal. The second model is intermediary, with high performance, and a very high mobility. At the educational level it has many pathways after 16 years of age. The third model is regulated, with predicted performances and weak mobility. The educational system has a dual character. The fourth model is under liberalization, with increasing performance and mobility. At the educational level it is based on a general structure. Undoubtedly, all these differences belong to cultural traditions that are supported by different values.

Hong also adopted a practice-based view of knowledge and engaging critically with Nonaka's SECI model, and argued that a successful implementation of it requires a 'glocalized' approach, "which involves trade-offs between core underlying values and objectives during the process of local translation" (Hong, 2011). I think that the problems are not just global or local but interdependent and interconnected. Methodological universality of a necessitarian type has to be replaced by a holistic integrative perspective that reintegrates cultural differences and discontinuities. Ethical values become one of the bonds that strengthen the organization and give it efficiency. Therefore, we will be able to talk about different managerial practices depending on various cultural frameworks which prioritizes and ranks differently in relation to the same managerial target

References

Bandera , C., Keshtkar, F., Bartolacci, M. R., Neerudu, S., and Passerini, K., (2017) "Knowledge Management and the Entrepreneur: Insights from Ikujiro Nonaka's Dynamic Knowledge Creation model (SECI)", *International Journal of Innovation Studies*, vol. 1, issue 3, pp. 163-174.

Barnes, S. B. and Dolby, R. G. A. (1970) 'The Scientific Ethos: A Deviant Viewpoint", *European Journal of Sociology*, 11, pp. 3-25.

Berger, P. L. and Luckmann, Th. (1966) *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Anchor Books. Garden City, NY.

Hong, Jacky F. L. (2011) "Glocalizing Nonaka's knowledge creation model: Issues and challenges" [online], *Management Learning*, vol. 43, issue 2, https://journals.sagepub.com/doi/10.1177/1350507611428853

Kuhn, Thomas S. (1970) *The Structure of Scientific Revolutions. Second Edition, Enlarged*, The University of Chicago Press, Chicago.

Matsudaira, Y. (2010) "'Ethos' Enabling Organisational Knowledge Creation", in M.D. Lytras *et al*. (eds.): *WSKS 2010, Organizational, Business, and Technological Aspects of the Knowledge Society*, Part II, CCIS 112, pp. 220–232.

Merton, R. K. (1942) "Science and Technology in a Democratic Order", *Journal of Legal and Political Sociology*, vol. 1, pp. 115-126.

Merton, R. K. (1976) *Sociological Ambivalence*, The Free Press, New York.

Mitroff, I. (1974) "Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists: A Case Study of the Ambivalence of Scientists", *American Sociological Review*, vol. 39, nr. 4, pp. 579– 595.

Mulkay, M. J. (1976) "Norms and ideology in science", *Social Science Information*, vol. 15, pp. 637-656.

Nishida, K. (1970) *Fundamental Problems of Philosophy: The World of Action and the Dialectical World,* Sophia University, Tokyo.

Nonaka, I. and Takeuchi, H. (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York.

Nonaka, I. and Konno, N. (1998) "The Concept of Ba. Building a Foundation for Knowledge Creation", *California Management Review*, vol. 40, no. 3, pp. 40-54.

Nonaka, I., Toyama, R. and Konno N. (2000) "SECI, Ba, and Leadership: A Unified Model of Dynamic Knowledge Creation", *Long Range Planning*, vol. 33, no. 1, pp. 5-34.

Nonaka, I., Toyama, R. and Konno N. (2001) "Emergence of "Ba": A Conceptual Framework for the Continuous and Self-transcending Process of Knowledge Creation", in Nonaka, I. and Nishiguchi, T. (eds.), *Knowledge Emergence. Social, Technical and Evolutionary Dimensions of Knowledge Creation,* Oxford University Press, Oxford, pp. 13-29.

Nonaka, I. and Toyama, R. (2003) "The Knowledge-Creating Theory Revisited: Knowledge Creation as a Synthetizing Process", *Knowledge Management Research & Practice*, vol. 1, pp. 2-10.

Nonaka, Ik. and Toyama, R. (2005) "The Theory of the Knowledge-Creating Firm: Subjectivity, Objectivity and Synthesis", *Industrial and Corporate Change*, vol. 14, issue 3, pp. 419-436.

Polanyi, M. (1966) *The Tacit Dimension*, Routledge and Kegan Paul, London.

Robertson, R. (1995) Glocalization: Time-Space and Homogeneity-Heterogeneity, in Featherstone, M., Lash, S. and Robertson, R., (eds.), *Global Modernities*, Sage Publications, London, pp. 25-44.
Shimizu, H. (1995) "Ba-Principle: New Logic for the Real-Time Emergence of Information", *Holonics*, vol. 5, no. 1, pp. 67-69.
Singley, M. K. and Anderson, J. R. (1989) *The Transfer of Cognitive Skill*, Harvard University Press, Cambridge MA.
Von Krogh, G., Ichijo, K. and Nonaka, I. (2000) *Enabling Knowledge Creation. How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation,* Oxford University Press, New York.
Vaniscotte, F. (2001) "Les systems éducatifs en Europe", *Futuribles*, no. 201, pp. 53-62.