A Critical Analysis of Nonaka's Model of Knowledge Dynamics

Constantin Bratianu
Academy of Economic Studies, Bucharest, Romania
cbratianu@yahoo.com

Abstract: The purpose of this paper is to present a critical analysis of the well known knowledge dynamics model elaborated by Ikujiro Nonaka and his co-workers. The essence of this model consists of three layers of the knowledge-creation process: (a) the process of knowledge creation through socialization-externalization-combination-internalization (SECI), the knowledge conversion process between tacit and explicit knowledge, (b) *Ba* the platform for knowledge creation, (c) knowledge assets. The success and popularity of this model created premises and temptations for using it beyond the conceptual limits initially defined, generating this way a superficial interpretation of the complex organizational knowledge dynamics. Our critical analysis aims at the investigation of the operational power of Nonakas model of knowledge dynamics within the framework of organizational knowledge. In the same time, we would like to apply the entropy law to SECI model and to see how the conversion processes conceived by Nonaka satisfy this law. Actually, although Nonaka considers socialization, externalization, combination and internalization as being conversion processes, only externalization and internalization are truly conversions. They consist in transforming tacit knowledge into explicit knowledge, and explicit knowledge into tacit knowledge, respectively. Socialization and combination are only processes of knowledge transfer, i.e. tacit knowledge to tacit knowledge, and explicit knowledge to explicit knowledge. Also, the evolving spiral is possible with inputs from the *Ba* platforms for knowledge creation and not with knowledge generation from within. The same evolving spiral of knowledge creation passes sequentially through individual processes and organizational processes in a deterministic way, although knowledge dynamics is not a physical process based on deterministic laws.

Keywords: explicit knowledge, knowledge conversion, knowledge creation, knowledge dynamics, tacit knowledge

1. Introduction

Ikujiro Nonaka and his co-workers created a consistent body of theory concerning knowledge creation in organizations based on four main ideas: a) knowledge creation at individual level is a direct result of the continuous dialogue between tacit and explicit knowledge; b) there are four basic knowledge conversion processes: socialization, externalization, combination and internalization; c) knowledge creation at the organizational level is based on these four conversion processes and a spiral driving force; d) there is a shared space *Ba* for knowledge creation (Nonaka, 1991, 1994; Nonaka et al., 1994; Nonaka & Takeuchi, 1995; Nonaka & Konno, 1998; Nonaka, Toyoma & Byosiere, 2001; Nonaka & Toyoma, 2007). The novelty of these ideas, and the correlation between them and Japanese companies success on the global market made of Nonaka one of the most prominent thinkers in knowledge management, and his model of knowledge creation became a new paradigm for organizational knowledge dynamics. Although we are going for simplicity of expression to refer to the Nonaka's model of organizational knowledge dynamics we recognize implicitly all the other contributions coming from his co-workers, in different stages of model development. Powerful concepts and paradigms have been always extended beyond their initial semantic boundaries until new ideas will integrated them into a new knowledge creating paradigm. Although such a new comprehensive paradigm has not been yet conceived, there are some new contributions showing the limits of the Nonaka's model, and there are some new ideas trying to build up a new perspective on knowledge creation and organizational knowledge dynamics (Agourram, 2009; Bereiter, 2002; Bratianu, 2008, 2009; Bratianu & Andriessen, 2008; Gourlay, 2006; Harsh, 2009; Hill, 2008; Styhre, 2006). The purpose of this paper is to critically analyze the conceptual and operational limits of the Nonaka's model of organizational knowledge dynamics, and to show the new perspective of this complex process. The next section of this paper will present briefly the fundamental elements of the Nonaka's model, and then we shall show its limitations and possible new directions of development.

2. The Nonaka's model of knowledge dynamics

In one of his seminal papers on the dynamic theory of organizational knowledge creation, Nonaka showed that previously the theory of organization has been dominated for a long time by the paradigm that conceptualizes a generic organization as a system designed for information processing and problem solving. Centrally to this paradigm is the efficiency of information processing in a static and deterministic environment. However, in his view "*Any organization that deals with a changing*

Reference this paper as
Bratianu, C. "A Critical Analysis of Nonaka's Model of Knowledge Dynamics" *Electronic Journal of Knowledge Management Volume 8 Issue 2 (pp193 --200), available online at www.ejkm com*

environment ought not only to process information efficiently, but also create information and knowledge" (Nonaka, 1994, p.14). Thinking of the Japanese companies interested in innovation, he considers that a paradigm based solely on information processing is not able to explain the innovation phenomenon. Having this shortcoming in mind he develops a new perspective based on a two-phase knowledge field, four basic conversion processes of knowledge, and a spiral driving force.

Nonaka defines knowledge as being "*justified true belief*", and consider knowledge as "*a dynamic human process of justifying personal beliefs as part of an aspiration for the truth*" (Nonaka, 1994, p.15). Thus, knowledge becomes a relative concept as personal belief, a view which limits very much its status of objectivity and its role in science. Based on the seminal work of Polanyi (1983), Nonaka considers knowledge composed of *tacit knowledge* and *explicit knowledge*. In his view, "*Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or to share with others. Subjective insights, intuitions, and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in an individual's action and experience, as well as in the ideals, values, or emotions he or she embraces*" (Nonaka & Takeuchi, 1995, p.8). Tacit knowledge contains two types of ingredients. One type refers to the skills and fingertips experience in mastering a certain domain of practical activity. The other one refers to the mental models, beliefs and perceptions so ingrained that we take them for granted. This second dimension is cognitive in its nature and generates our image of surrounding reality. The most important characteristic of the tacit knowledge is that it is hard to articulate it in words and communicate it using language. It is there in our brain and body but we do not know how to explain it. In a very suggestive expression Polanyi (1983, p.4) underlined this aspect: "*I shall reconsider human knowledge by starting from the fact that we can know more than we can tell".* In contrast to this tacit knowledge which is very subjective and hard to express in words and numbers, explicit knowledge represents the rational part of our knowledge which can be express and explained easily in words and numbers. It can be communicated to other individuals and it can be processed. One of the most important ideas about these two forms of knowledge comes from their dynamics, as explained by Nonaka and Takeuchi (1995, p.9):"*For tacit knowledge to be communicated and shared within the organization, it has to be converted into words or numbers that anyone can understand. It is precisely during this time this conversion takes place – from tacit to explicit, and, as we shall see, back again into tacit – that organizational knowledge is created*". Nonaka considers that developing and valuing explicit knowledge is characteristic mainly for the Western culture, while developing and using successfully tacit knowledge is a characteristic of the Eastern culture (Nonaka, 1994; Nonaka & Takeuchi, 1995). This kind of arguments may be found as well in the works of Andriessen (2006, 2008), Andriessen and Boom (2007).

Nonaka (1994) considers two dimensions for knowledge creation: epistemological dimension and ontological dimension. The first dimension is related to the conversion of knowledge from tacit level to explicit level, and from explicit level to the tacit level. The second dimension is related to the conversion of knowledge from individuals to groups and further to organization. Combining these two motions Nonaka gets a spiral model for knowledge creation and processing. Also, he makes a fundamental assumption which is the core of the SECI model: "*The assumption that knowledge is created through conversion between tacit and explicit knowledge allows us to postulate four different 'modes' of knowledge conversion: (1) from tacit knowledge to tacit knowledge, (2) from explicit knowledge to explicit knowledge, (3) from tacit knowledge to explicit knowledge, and (4) from explicit knowledge to tacit knowledge*" (Nonaka, 1994, p.19). The first process, of creating tacit knowledge through shared experience has been called *socialization.* Tacit knowledge is hard to formalize and to express using language. It is context related. It is the way apprentices learn their craft through observation and imitation from their masters. The second process is a result of social interaction through language. This process of creating explicit knowledge from explicit knowledge has been called *combination.* The third and forth processes are different from the previous ones since they involve both types of knowledge. These transformation processes are based on idea that tacit and explicit knowledge are two complementary forms of knowledge in a continuous interaction. The third process of transforming tacit knowledge into explicit knowledge has been called *externalization.* The success of this process depends on sequential use of metaphors, analogies and models (Nonaka, Toyama & Byosiere, 2001). The fourth process is dealing with transformation of explicit knowledge into tacit knowledge, and it has been called *internalization.* This is a process of embodying explicit knowledge as tacit knowledge. It is closely to learning by doing. The first three processes are related in Nonaka's view to organizational learning, while the last one is related to individual learning. Based on these above ideas, Nonaka concludes that organizations create knowledge continuously by restructuring the existing knowledge basis through the synergy of the four fundamental processes of

knowledge transformation: "*That is to say, knowledge creation centers on the building of both tacit and explicit knowledge and, more importantly, on the interchange between these two aspects of knowledge through internalization and externalization"* (Nonaka, 1994, p. 20).

The foundation of these four basic processes is *Ba,* a rather fuzzy concept proposed by the Japanese philosopher Kitaro Nishida, and further developed by Shimizu. *Ba* is defined "*as a context in which knowledge is shared, created, and utilized, in recognition of the fact that knowledge needs a context in order to exist*" (Nonaka, Toyama & Byosiere, 2001, p.499). This context can be tangible, intangible or any combination of tangible and intangible elements. In this perspective, the concept of knowledge is strongly related to a given material and cultural context, beyond the fact that it is has been considered a personal belief. Knowledge belonging to given person may be shared, recreated or amplified when that person is an active actor in *Ba.* To make things even more confused, Nonaka, Toyama and Byosiere (2001, p.499) consider that "*Ba as an interaction means that Ba itself is knowledge rather than a physical space containing knowledge or individuals who have knowledge*".

3. Functionality of the Nonaka's model and its limits

The main assumptions of this model constitute in the same time the degree of freedom and the limits of its functionality. One such assumption is the relative consistency of knowledge as a *justified true belief*. That means that knowledge creation can be described with respect to a given cultural framework, which is at a microscale the cultural horizon of individual, and at macroscale the cultural horizon of a country. The Nonaka's model of knowledge dynamics in organizations can be very well understood and used in the context of Japanese culture, but it is unlikely to produce successful results in other cultures. The basic cornerstone is the concept of *Ba* which hardly can be understood in a culture where the Cartesian dualism produced such a gap between rational and non-rational worlds. Also, this concept is related to the Japanese specific interpretation of no-thing-ness: "*No-thing-ness is not to be understood as a 'thing' because it then would be based on a conception of something, which would be no-thing… If you understand what exists then you can understand that which does not exists. This means that although it is impossible to know that which does not exists, it is possible to know that if "anything is anything, then everything is everything'… The spirit of no-thing-ness means that there is no such thing as relying upon anything at all outside of your individual mind"* (Kaufman, 1994, pp.104-105).

Postulating the four basic processes of knowledge dynamics, i.e. socialization, externalization, combination and internalization, and integrating them into a pattern of knowledge conversion Nonaka is blurring the lines between individuals and groups. Knowledge conversion from tacit to explicit and from explicit to tacit, according to the epistemological dimension (Nonaka, 1994; Nonaka & Takeuchi, 1995), is clearly a process developed at the individual level. There is no meaning for such a process to be developed between the tacit knowledge of a given person and the explicit knowledge of another person. However, the knowledge conversion from tacit to tacit, and from explicit to explicit develops between different individuals. If the whole spiral of knowledge creation would be considered for only two individuals, at the limit, it could be understood. But, if we would consider a group of people, it is hardly difficult to explain and demonstrate how the knowledge conversion works because of the sequential interplay between strictly individual processes and group processes. As a metaphor, the spiral of knowledge creation (Nonaka &Takeuchi, 1995, Fig.3-3) is an excellent solution. However, for any attempt of practical analysis and evaluation this spiral knowledge creation represents an almost impossible task. Although Nonaka and his co-workers consider all four basic processes to be designed for knowledge *conversion*, actually only two of them satisfy the condition of transforming one form of knowledge into another form of knowledge. They are: externalization and internalization. Externalization means to get some explicit knowledge out of the own experience, in a form that can be transferred through the process of combination. Internalization is the reverse process by which some valuable knowledge got through combination can be stored in a specific way as experience, and used accordingly in the decision making. However, there is a difference between the capacity of a given individual to perform externalization and internalization, and his or her motivation. Also, it is important to note the fact that these two processes are not done in an automatic way, but with some cognitive efforts. Socialization and combination are processes designed for *exchange* of knowledge from one person to another, and not for knowledge transformation. Thus, Nonaka's model is not actually a cycle of knowledge conversion processes, as claimed by authors.

The epistemological dimension of the Nonaka's model is based on transforming tacit knowledge into explicit knowledge and vice versa. However, these transformations raise some questions concerning

knowledge dimensions. Explicit knowledge has only one dimension, which the extensive dimension. Knowledge obtained, for instance, in mathematics like 2+2=4 cannot have intensity. It has only the extensive dimension, which is a quantitative one. However, the tacit knowledge contains emotions. Any emotion is characterized by *extensive* and *intensive* dimensions. The level of intensity is similar to temperature in characterizing the heat. Thus, an emotion may have a higher temperature than another emotion for the same person, or an emotion may have a higher temperature than the same emotion generated in a another person. Now, the question is: how can we consider transforming emotions as tacit knowledge (i.e. knowledge with two dimensions) into explicit knowledge (i.e. knowledge with only one dimension). The spiral of organizational knowledge creation considered with respect to the ontological dimension (Nonaka & Takeuchi, 1995, Fig. 3-5) originates in the middle management and evolves upward and downward. This might be the specific of Japanese management, but it is hardly efficiently in the Western management, where the decision making process is always a top-down process. The Nonaka's model for organizational dynamics is based on creation and flow of knowledge. The analogy is made with the flow of water, but we know from fluid dynamics that any flow is generated by a pressure difference. Looking into this knowledge dynamics model we see no such thing as a pressure field and no pressure difference able to generate the *flow* of knowledge. Once again, the metaphor is beautiful but the practical application is rather difficult.

Socialization is the first knowledge transfer process considered by Nonaka, which reflects the tacit knowledge-tacit knowledge exchange. It is the process of bringing together tacit knowledge through shared experiences. However, since tacit knowledge is context-specific, it is important to note that people can share same experience through joint activities. However, tacit knowledge transfer meets several individual and organizational barriers, among them *stickiness* being the most important (Szulanski, 1996, 2000; Szulanski and Jensen, 2004). According to Szulanski, the notion of internal stickiness connotes the difficulty of transferring knowledge within the organization. Actually, von Hippel (1994) coined the expression "sticky information" to describe information that is difficult to transfer. "*Contrary to the conventional wisdom that places primary blame on motivational factors, the major barriers to internal knowledge transfer are shown to be knowledge-related factors such as the recipient's lack of absorptive capacity, causal ambiguity, and an arduous relationship between the source and the recipient*" (Szulanski, 1996, p.28). The effectiveness of the socialization process depends also on the organizational culture and the balance between individual competition and group cooperation (Bratianu and Orzea, 2010; Holste and Fields, 2010).

Nissen (2006) developed the *knowledge flows model* for the organizational knowledge dynamics. This new concept represents more than just a metaphor; it explains the phenomenon of how knowledge moves through an organization. The Nissen's model is based on the Nonaka's model, but it is extended to a three dimensional framework with time as a fourth dimension. Thus, Nissen extends Nonaka's two dimensional model to integrate two complementary dimensions: *life cycle* and *flow time.* According to Nissen, "*Life cycle refers to the kind of activity (e.g., creation, sharing, application) associated with knowledge flows. Flow time pertains to the length of time (e.g., minutes, days, years) required for knowledge to move from one person, organization, place, or time to another*" (Nissen, 2006, p.35). Nissen is using a metaphorical approach, introducing the concepts of "light mass" and "heavy mass". In his view, tacit knowledge would correspond comparatively to "heavy mass" in the context of knowledge dynamic, which means a slow flow and a long flow time. On the contrary, the explicit knowledge would correspond to the "light mass", which means rapid flows and short flow time. Thus, socialization is a rather slow process because it involves the transfer of the tacit knowledge, while combination is a rapid process because it involves the transfer of explicit knowledge. The extended model developed by Nissen brings in new dimensions and better possibilities of knowledge dynamics understanding and mapping. Including time explicitly, the extended model increases its dynamic capacity of representing knowledge flows at the organizational level. However, in fluid dynamics the flow is generated by a pressure field, and the flow is characterized by a velocity field. In the Nissen,s model there is no pressure field analog which makes it difficult to understand the direction of knowledge flow and the gradient of the knowledge field.

Harsh (2009) reiterates that Nonaka does not consider the fact that a significant part of the initial knowledge is flowing through the cycle many times, which actually means that there is a kind of reusable knowledge. "*It is a surprise that in spite of great attention to knowledge creation and sharing theories and issues, the reusable knowledge has not been discussed explicitly during knowledge transformation in the Nonaka model*" (Harsh, 2009, p.2). Also, Harsh reminds us that any conversion or transfer of knowledge consumes time, which does not appear as a variable in the Nonaka's

knowledge dynamics model. The organizational knowledge changes with time, and the effective knowledge of a generic organization can be increased through the reuse of knowledge. Thus, reusable knowledge is a fact of organizational life and it must be included in the modelling of knowledge dynamics. Since the SECI model is basically a two dimensional construct, Harsh introduces a third dimension, proposing a three dimensional knowledge management and explicit knowledge reuse (Harsh, 2009).

4. Knowledge dynamics and thermodynamics

Bratianu and Andriessen (2008) analyzing the metaphor *knowledge as energy* showed new opportunities for understanding knowledge dynamics. Knowledge can be considered as a *field,* a continuous nonuniform and nonhomogeneous distribution of meanings and feelings in a certain organizational design and physical space. Time variations and space nonuniformities generate forces trying to decrease field nonuniformity. This new perspective may help in explaining the generic forces able to determine the flow of knowledge in organization. If there is a concentration of the knowledge field in the middle level management with respect to the top management or the executive line management, then and only then the flow of knowledge will have the direction and motion described by the Nonaka's spiral knowledge dynamics.

Bratianu and Andriessen (2008) made an analogy between potential energy and tacit knowledge on one hand, and kinetic energy and explicit knowledge on another hand. Having in mind the transformation process of the potential energy into kinetic energy and mechanical work, the authors postulate the same possible process for transforming tacit knowledge into explicit knowledge. That means that externalization should be used actually for generating cognitive work through explicit knowledge. Cognitive work means any rational process done in decision making. In the reverse way, kinetic energy can be transformed into potential energy by consuming mechanical work, which means that explicit knowledge cannot transform itself into tacit knowledge without some work to be done. It is necessary to consume cognitive work in order to realize the internalization process. Thus, knowledge conversion processes postulated by Nonaka and his co-workers cannot be realized by themselves without any production or consumption cognitive work.

In conclusion, with all their limitations, Nonaka and his co-workers developed the dyad of tacit knowledge – explicit knowledge, and all their effort is to describe the dynamics between these two forms of knowledge. However, considering knowledge as a field of meanings and feelings already we may promote a new dyad: cognitive knowledge – emotional knowledge. Emotional knowledge is generated by emotions, which may be considered as states of our body and mind. Emotions are characterized by the following generic constituents (Hill, 2008, p.78):

- A feeling component – physical sensations, including chemical changes in the brain.
- A thinking component – conscious or intuitive 'thought' appraisal.
- An action component – expressive reactions (like smiles), as well as coping behaviours (think fight or flight).
- A sensory component – sights, sounds, etc., which intrude and serve to trigger the emotional response.

According to Hill (2008, p.79): "Emotionality is distinguished from rationality because the latter only involves one of these four components: thinking. Unlike an emotion, thinking may, but is less likely to, have a sensory component". However, emotionality does not contain rationality. Rational thought involves conscious, deliberate, evaluative assessments. Emotions, on the other hand, are existential states of body and mind generated by feelings. Due to their direct short-cuts to the mind, emotions are always faster than thoughts in the decision making process, and thus they are able to mobilize the body in case of emergency. Emotions work very well with the adaptive unconscious, and they are able to yield a snap judgement based on so called "thin-slicing". This mechanism refers to the power of our slices of experience (Gladwell, 2005). Emotional knowledge has two dimensions: time of existence, and intensity of manifestation. The first dimension is a quantitative one and it can be measured easily in a psychology laboratory. The second dimension is qualitative in nature and it can be measured more difficult. By contrast, cognitive knowledge has only one dimension which is closely related to a metrics. Thus, the quantity of cognitive knowledge should be evaluated in a different way than the quantity of emotional knowledge. However, at this moment knowledge evaluation is in its early trial and error phases, without workable method and metrics.

Knowledge as energy is a challenging metaphor since we may use the fundamental concepts of thermodynamics. As a science, thermodynamics is concerned with the generation, transport, and dissipation of heat as a form of energy. That means also the transformation process of mechanical work into heat, and of variation of heat into mechanical work in complex systems. In a similar way we can postulate that the variation of total knowledge at a certain level is a result of cognitive work and emotional heat involved in the transformational process. By cognitive work we may refer to any knowledge processing event which is capable of generating action at individual or organizational level. In the field theory, any non-uniform distribution in time or space generates forces, and any variation of these forces generates fluxes which tend to produce uniformity. This is true for the knowledge field as well, and we may coin the concept of cognitive work as a result of variation of cognitive fluxes at the individual level or organizational level. A cognitive work is actually any flux which may generate, or which can be generated by a knowledge field variation. By emotional heat we may consider the emotional flux which has been induced or produced as a result of a knowledge field variation. Considering all of these new aspects of knowledge creation and transformation, we should be re-thinking the Nonaka's model of knowledge dynamics.

The second law of thermodynamics has many formulations and interpretations. However, the kernel of this law is that heat can flow by its nature from a body with a higher temperature, toward a body with a lower temperature. These two bodies can be in direct contact, or not. The reverse process can be done only by performing mechanical work. Using our metaphor, we may say that in the target domain knowledge can be transferred only from a person having a higher knowing level toward a person with a lower knowing level. The reverse process can be done only by performing some intellectual work. This idea can be further developed by using similarities between the Carnot cycle used in thermodynamics and the SECI cycle used in knowledge management.

5. Conclusions

The purpose of this paper is to present a critical analysis of the knowledge dynamics model elaborated by Ikujiro Nonaka and his co-workers. The essence of this model consists of three layers of the knowledge-creation process, including *Ba* platforms for knowledge creation, and SECI (socialization-externalization-combination-internalization) evolving spiral for knowledge conversion. Our critical analysis aims at the investigation of the operational power of Nonaka's model of knowledge dynamics within the framework of organizational knowledge. One of our first conclusions is that the whole knowledge dynamics model is embedded in the Japanese culture and the Japanese companies' organizational behaviour. Thus, limitations come from the working assumptions made by these above authors. Then, considering the whole cycle we may postulate the fact that o good part of the flowing knowledge passes several times through the spiral channels, which raises the question of reusable knowledge. Introducing this reusable knowledge into the model means to expand the two dimensional knowledge dynamic model into a three dimensional one.

The emergence of a new knowledge dyad composed of cognitive and emotional knowledge suggests a new dynamics: transforming cognitive knowledge into emotional knowledge, and of emotional knowledge into cognitive knowledge. However, there are some new aspects related to the dimensionality of each form of knowledge. Cognitive knowledge has only an extensive dimension, while the emotional knowledge has an extensive dimension, and an intensive dimension. By similarity to the thermal energy we may use the concept of temperature for this intensive dimension of emotional knowledge. Finally, the metaphorical analysis of knowledge as energy shows that we may consider the entropy law to suggest that knowledge can be transferred only from a higher level of knowing toward the lower level of knowing.

References

Andriessen, D. (2006) "On the metaphorical nature of intellectual capital: a textual analysis", *Journal of Intellectual Capital,* Vol.7, No.1, pp.93-110.

Andriessen, D. (2008) "Knowledge as love. How metaphors direct our efforts to manage knowledge in organisations", *Knowledge Management Research & Practice*, No.6, pp.5-12.

Andriessen, D. & Van den Boom, M. (2007) East is East and West is West and (n)ever its intellectual capital shall meet. *Journal of Intellectual Capita*l, Vol.8, No.4.

Agourram, H. (2009) "The quest for the effectiveness of knowledge creation", *Journal of Knowledge Management Practice*, Vol.10, No.2, June, pp.1-7.

Bereiter, C. (2002) *Education and mind in the knowledge age*, Lawrence Erlbaum Associates, Mahwah, NJ and London.

Bratianu, C. (2008) "Knowledge dynamics", *Review of Management and Economical Engineering*, Vol.7, Special Issue, pp.103-107.
Bratianu, C. (2009) "Challenges for knowledge management research", in: Bratianu, C., Lixandroiu, D., Pop, N. (eds.) *Business excellence*, Vol.1, pp.52-56, Infomarket, Brasov.
Bratianu, C., Andriessen, D. (2008) "Knowledge as energy: a metaphorical analysis", *Proceedings of the 9th European Conference on Knowledge Management*, Southampton Solent University, 4-5 September 2008, pp.75-82, Academic Publishing, Reading.
Bratianu, C., Orzea, I. (2010), "Tacit knowledge sharing in organizational knowledge dynamics", *Proceedings of the 2nd European Conference on Intellectual Capital*, ISCTE Lisbon University Institute, Lisbon, Portugal, 29-30 March 2010, pp.107-1114, Academic Publishing, Reading.
Gladwell, M. (2005) *Blink. The power of thinking without thinking*. New York: Back Bay Books.
Gourlay, S. (2006) "Conceptualizing knowledge creation: a critique of Nonaka's theory", Journal of Management Studies, Vol. 43, No.7, November, pp.1415-1436.
Harsh, O.K. (2009) "Three dimensional knowledge management and explicit knowledge reuse", *Journal of Knowledge Management Practice*, Vol.10, No.2, June, pp.1-10.
Hill, D. (2008) *Emotionomics. Leveraging emotions for business success*, Revised Edition, kogan Page, London.
Holste, J.S., Fields, D. (2010), "Trust and tacit knowledge sharing and use", *Journal of Knowledge Management*, Vol.14, No.1, pp.128-140.
Kaufman, S.F. (1994) *The martial artist's book of five rings. The definitive interpretation of Miyamoto Musashi's classic book of strategy*, Tuttle Publishing, Boston.
Nissen, M.E. (2006), *Harnessing knowledge dynamics. Principled organizational knowing & learning*, IRM Press, Hershey.
Nonaka, I. (1991) "The knowledge-creating company", *Harvard Business Review*, Vol.69, No.6, pp.96-104.
Nonaka, I. (1994) "A dynamic theory of organizational knowledge creation", *Organization Science*, Vol.5, No.1, February, p. 14.
Nonaka, I., Byosiere, P., Borucki, P.C., Konno, N. (1994) " Organizational knowledge creation theory: a first comprehensive test", *International Business Review*, Vol.3, No.4, pp.337-351.
Nonaka, I., Takeuchi, H. (1995) *The knowledge-creating company. How Japanese companies create the dynamics of innovation*, Oxford University Press, Oxford.
Nonaka, I., Konno, N. (1998) "The concept of 'Ba': building a foundation for knowledge creation", *California Management Review*, Vol.40, No.3, Spring, pp.40-54.
Nonaka, I., Toyama, R., Byosiere, Ph. (2001) "A theory of organizational knowledge creation: understanding the dynamic process of creating knowledge", in: Dierkes, M., Antal, A.B., Child, J., Nonaka, I. (eds.) *Handbook of organizational learning and knowledge*, pp.487-491, Oxford University Press, Oxford.
Nonaka, I., Toyoma, R. (2007) "Why do firms differ? The theory of knowledge-creating firm", in: Ichijo, K., Nonaka, I. (eds.) *Knowledge creation and management. New challenges for managers*, pp.13-32, Oxford University Press, Oxford.
Polanyi, M. (1983) *The tacit dimension*, Peter Smith, Gloucester, Massachusetts.
Styhre, A. (2004) "Rethinking knowledge: a Bergsonian critique of the notion of tacit knowledge", *British Journal of Management*, Vol.15, pp.177-188.
Szulanski, G. (1996), "Exploring internal stickiness: impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol.17, Winter special issue, pp.27-43.
Szulanski, G. (2000), "The process of knowledge transfer: a diachronic analysis of stickiness", *Organizational Behavior and Human Decision Processes*, Vol.82, No.1, May, pp.9-27.
Szulanski, G, Jensen, R.J. (2004), "Overcoming stickiness: an empirical investigation of the role of the template in the replication of organizational routines", *Managerial and Decision Economics,* Vol.25, pp.347-363.
Von Hippel, E. (1994), "Sticky information and the locus of problem solving: implications for innovation", *Management Science*, Vol.40, No.4, pp.429-439.

