A theoretical systemic analysis of organizational tacit knowledge memorization

I. Zouaghi

Centre d'Etudes et de Recherches Appliquées à la Gestion_ U.M.R. C.N.R.S. 5820

CAHIER DE RECHERCHE n°2011-08 E5

A theoretical systemic analysis of organizational tacit knowledge memorization

Iskander ZOUAGHI

Unité Mixte de Recherche CNRS / Université Pierre Mendès France Grenoble 2
150 rue de la Chimie – BP 47 – 38040 GRENOBLE cedex 9
Tél. : 04 76 63 53 81 Fax : 04 76 54 60 68

A theoretical systemic analysis of organizational tacit knowledge memorization

Iskander ZOUAGHI
CERAG, Grenoble University/CNRS
Grenoble, France

ABSTRACT

In supply chains, which are organizational systems that integrate complex behavioral interactions, partners adopt bipolar strategies that join paradoxical and constructive behaviors to evolve in nowadays environment. This enables them, on one hand, to converge towards common interests through the development of cooperative actions and strategies; and on the other hand, to deviate on their own interests by adopting competitive maneuvers. This dynamics generates an ago-antagonistic system where both of these two concepts, namely cooperation and competition, simultaneously drive the supply chain. In the present article, this system is analyzed by using ago-antagonistic systems theory in order to have a new apprehension of the supply chain approach.

Keywords — Supply chain, ago-antagonistic system, bipolar strategies.

INTRODUCTION

Most organizations evolve today in a complex environment in which competition is becoming more and more intense pushing companies to develop distinctive competencies by mastering knowledge and technology. The critical and distinctive knowledge of a company do not particularly lies on automated information systems that use structured information and explicit business rules. It is thus becoming more and more tacit. Moreover, keeping and developing this knowledge is not an easy task knowing that there is a loss of skills and capabilities due to impending retirement or an accelerated turnover of specialists and experts. Neglected for years by academics and professional, tacit knowledge development and use

emerge as one of wealth and value sources for most businesses. Soon, many authors raised the issue in terms of organization of knowledge transfer, offering complex information management systems relied on information technology and communications designed to solve all problems. However, given the proliferation of knowledge, the problem is no longer to manage all but knowing locate and identify key knowledge-related strategic objectives of organizations. This will be to focus on them, and especially to enable the development and exchange of knowledge through more open and collective working practices, as well as teaching methods and scalable and responsive training.

The apprehension of the organization with a systemic point of view takes us to adopt a complex thought. This way of thinking allows us to address the organization as a whole. Thus, individual learning will lead to organizational learning, which later will differentiate the organization as a whole from all its individual members' knowledge. So, in this paper, the fundamental question concerns the acquisition, the storage and the reuse of corporate tacit knowledge so that the company can memorize learned knowledge and disseminate it through its individuals.

To address this issue, our paper has been divided into four parts. In the first part we will present a critical overview of the notion of tacit knowledge. In the second part, we will show how a company uses tacit knowledge to learn. The third part will focus on learning organization towards a systems thinking. The last part will deal about organizational memory and organizational knowledge creation.

TAWARD TACIT KNOWLEDGE DEFINITION: A CRITICAL APPROACH

Polanyi (1966) says that we can know more than we can tell. His woks have influenced significantly a set of contemporary works on organizational knowledge nature. The idea of tacit knowledge is very important for those trying to understand competitive advantage sources. This advantage comes partially from knowledge that cannot be expressed and also from the organizations experiences that provide specific skills and capabilities that cannot be imitated by competitors (Barney, 1991). While tacit knowledge can generate a unique competitive advantage to the company, it cannot easily be capitalized and disseminated between different parts of the same organization (Szulanski and Capet, 2001).

The notion of tacit knowledge was introduced by Polanyi (1966), a philosopher who has become well known in the citations of his work in the writings of Kuhn (1970) and since then has had a renaissance with the writings of Nonaka and Takeuchi (1995). As noted by Polanyi (1966), “we can know more than they say.” means that ineffable knowledge exists in individuals and organizations but they cannot easily identify it. Nonaka and Takeuchi (1995) used the notion somewhat differently from how they were by Polanyi himself. However, because of the influence of Nonaka and Takeuchi (1995) works on the knowledge management field, the idea “relatively ambiguous” has been widely adopted. While Polanyi (1966) speaks of tacit knowledge as a backdrop from which all actions are understood. Nonaka and Takeuchi (1995) use the term to denote particular knowledge that is difficult to express.

Thus, in contemporary literature, the meaning of tacit knowledge has little in common with the conception of Polanyi (1966). More oriented towards the vision proposed by Nonaka and Takeuchi (1995), tacit knowledge is defined as knowledge that is not yet articulated. That is to say that it represents a set of rules embodied in the activity in which the individual is involved, that can later, and it's just a matter of time, transmit it in a certain learning process.

In his critique of rationalism, Oakeshott (1991), in the same line of Polanyi (1962), distinguishes two types of knowledge, namely the technical knowledge and practical knowledge. Technical knowledge is the knowledge of the rules, while practical knowledge represents skills and abilities. For this author, it is clear that skills and the know-how, or in other words, competency can not be transmitted from one person to another, and acquired easily by simply following rules. The knowledge can be acquired only through “learning by doing” under the watchful eye of the master (teacher). The value of this analysis lies in its usefulness to the understanding of scientific knowledge (which is often confused with explicit knowledge).

Scientific knowledge is neither mechanistic neither nor explicit. It is made by people that are deeply involved, that are scientists and have learned their profession in a number of years working as teachers. Scientific knowledge is often seen as purely representative of technical knowledge or set of facts, however, the work behind this knowledge and these facts, intuition, beliefs, and several hours of interaction with other scientists is the real driving force behind the progress in science. Thus, the metaphor of the “pipe line” behind many discussions on communication (Tsoukas, 1997) emphasizes

that Nonaka and Takeuchi (1995), considering the ideas as objects that can be transmitted between individuals in using behavior, reduces practical knowledge to technical knowledge (Costelloe, 1998). Process practical knowledge, which is tacit in nature and therefore cognitive initially, as having content that can be easily set and then translated into explicit knowledge (Nonaka and Takeuchi, 1995), is the reduction of “what is known” to “what can be articulated”, hence the concept of tacit or “practical” knowledge is impoverished (Tsoukas, 2002).

Weick (1995) explains practical knowledge from the fact that it redefines the specific differences in all activities to attract the attention of those who are involved in order to distinguish certain aspects hitherto unnoticed, and also to see the connections between the various items imagined disconnected before. This systems approach of practical (tacit) knowledge formation is supported by Shotter and Katz (1996), in that tacit knowledge is acquired by engaging in practical activity through participation in social practices, under the supervision of people who are generally more experienced (Taylor, 1993), who, by attracting attention from certain things, can see the interconnections (Wittenstein, 1958).

In conclusion, we can say that tacit knowledge has a multitude of definitions and interpretation. Nonaka and Takeuchi (1995) consider tacit knowledge as knowledge not yet articulated or knowledge waiting to be translated or converted into explicit knowledge. This interpretation has been widely adopted in management, is flawed in that it ignores the ineffable nature of tacit knowledge (Tsoukas, 2002). The ineffable nature does not mean that we cannot discuss the possibilities of learning. However, it should limit insisting on the fact that tacit knowledge must be converted into explicit one, and instead focus on the creation of tacit knowledge, taking into consideration his personal feature, in the sense that it cannot be captured, translated or converted, but only displayed and manifested in the activities (Tsoukas, 2001). So for learning organization, the goal is not to transform tacit knowledge into explicit, but promote the emergence of new knowledge from the interaction between the tacit and explicit knowledge of all individuals involved in the performance of its activities, and in order to achieve the ultimate objective of the organization that is learning for the creation of a specific “intangible capital” generating a sustainable competitive advantage.

ORGANIZATIONAL LEARNING AND TACIT KNOWLEDGE

Organizations can learn only through individuals who constitute them. However, all do not promote individual learning. Some time ago, trying to understand causes already disobedience. In addition, few organizations try to capitalize knowledge developed by their members. Also note that all forms of learning are not necessarily geared towards the formulation, oral verbalization or rather codification. However, researchers tend to focus on learning that manifests in customary forms.

The company, until now, had no such worries. Gradually, as it is concerned with knowledge capitalization, it will provide it in forms that are appropriate to its context. It appears that the new designs are also different from the professional approach (how) as of the theoretical approach (why). In fact, each approach corresponds to a particular purpose and limited in a world that is changing gradually. Today, every company needs to adjust its forms of expression and its formalization standard. It must quickly mobilize knowledge in environments that are more versatile.

In addition, tacit knowledge is mainly personal and comes from the experience of each individual. The fact that knowledge is inseparable from its owner's, implicate that its departure means that it necessarily causes the loss of this individual tacit knowledge. One of the consequences of high turnover within the company is knowledge loss. Conversely, the hiring of workers who have had previous experience in the industry, a competitor, supplier or customer, is a knowledge contribution within the organization (Dostaler and Boiral, 2000).

Organizational learning can be defined as the ability of an organization to organize and enhance the effectiveness of its collective action over time. Nevis et al. (1995) defines it as the capacity or processes within the organization that can improve its performance based on his experience. It should be emphasized again that there is no organizational learning without individual learning, yet the organizational learning process is much more complex because it must be understood from a systems approach. In this sense, individuals mental models play a central role because, according to Argyris and Schön (1978), organizational learning is based on the "shared mental models".

The concept of organizational learning adopted is that, now common since the work of Argyris and Schön (1978), that distinguishes in single loop and double loop learning. The single loop learning is a

process of behavioral adaptation / response or correction of errors in organizational patterns established and not challenged. Double-loop learning is a cognitive process of challenging mental models which led to the adoption and production of new patterns of knowledge, thought and action.

For Argyris (1992), tacit knowledge is the basis of a first efficient and effective management, but also, it can also be the cause of his deterioration. The main objective of effective management is the definition and transformation of required behavior to action-based routines, to achieve organization objectives (Argyris, 1993, Argyris and Schön, 1996, Nelson and Winter, 1977). These routines are implemented through skillful actions that are necessarily based on tacit knowledge.

To better understand this, Argyris and Schön (1996) have focused on action strategies, which led them to develop action theories. The individual shapes of two theories of action: the professed theory (what we say) and the theory of use (what we do). Although, they were able to detect many different behaviors, the authors have noticed that they met only two theories of use they called Model I and Model II.

Argyris and Schön have invested for nearly two decades in analyzing conscious and unconscious individuals reasoning processes within an organization (Dick and Dalmau, 1990). They assume that people are designers of their actions. These perform actions in order to achieve their goals and learn when they perform actions that seem effective. In other words, Argyris and Schön (1974), argue that all individuals have within their minds cognitive maps from which they plan, implement and correct their actions.

These authors also add that there are few individuals who are aware that the cards on which they rely to act, not the theories they explicitly state. However, they are aware of the maps or theories they use (Argyris, 1980). In simple terms, this finding does not only or simply the difference between what people say and what they do. Argyris and Schön (1996) suggest that there is a theory correspond to what people say and another on what they do. So the distinction is not made between theory and action, but between two different "theories of action" (Argyris et al., 1985), hence the concept of "theories professed" and of "theory of use ".

As a result, the theory is professed values and common views on why people believe that their behavior is based. And the theory of use is where the behavior of individuals, or they use the cards to act, involving the views and values. Reformulating, we can say that people are unaware that the usual theories are not the same as the theories professed, and they are even unaware of their use of theories which implies that much their knowledge is tacit.

Argyris and Schön argue that these theories of action determine the total purposeful behavior of individuals. Argyris (1987) suggests that one of the reasons that led him to insist that the actions of individuals are the result of a theory is the claim that everything is done by these individuals is not accidental . People see their activity and are therefore responsible for the design. Argyris also states that in designing their work, people are generally unaware of this design and its difference with what is said. This has aroused in him a question: if individuals are unaware of the theories that guide their actions (theories of use), so how can they effectively manage their behavior? Argyris (1980) suggests that the effectiveness results from developing congruence between theory and use the theory professed.

The models developed by Argyris and Schön are designed to help people become aware of the appearance of tacit knowledge and then be able to make more informed about the actions they design and implement. In this context, they developed models that were presented above, namely the model of single loop learning and model learning double-loop, these models attempt to explain the processes that create and maintain the Theory of use of individuals in other words that enable individual learning that engenders not a result of organizational learning.

Organizational learning is an emerging interaction between all the mental maps of all the individuals who compose it. According to a systems approach, the organization is not the sum of its parts, but it all with a specific behavior. It is a system of norms and meanings shared by the actors, or cognitive maps, as Chris Argyris called the theories of use (Tabourbi, 2000).

LEARNING ORGANIZATION AND SYSTEMS THINKING

A lot of works have been done to materialize bipolar strategies adopted by organizations in different logistics and supply chain management fields. Concerning sourcing strategies, some companies adopt hybrid sourcing strategies, known as parallel sourcing strategies [49]. This kind of bilateral strategy integrates cooperation and competition in the same rational.

It is known in the literature that the transfer of knowledge and learning are best in an organization that is called learning. Skule (1999) states that the lack of knowledge transfer can be likened to a lack of development in the various models follow the rules that govern all practices within the organization. As learning organizations encourage knowledge transfer, they necessarily help to achieve the processes and structures for double-loop learning. As a result, organizational routines will suggest what the organization needs, and will automatically determine the solutions on the problems (Shaffer, 1981).

The concept of learning organization is a concept that has recently appeared in the literature. Garvin (2000) provides a clear definition of this concept has not yet been established. However, there are some definitions which occur more or less often in the literature. Peter Senge (1990), which is one of the first to study this concept, defined learning organizations as "organizations where people continually spend their ability to create truly desired results, where new and expensive models thinking are nurtured, where collective aspiration is set in a free and where people learn in a way so that they can continuously grasp the whole as a whole. " For Pedler et al. (1991), "a learning organization is a vision of what can be possible. It can be caused simply by training individuals, it can only happen as the result of learning at the whole organization. A learning organization is an organization that facilitates the learning of all its members and is transformed in this way, a continuous way. " Also, Learning organizations "are characterized by the total involvement of employees in processes conducted in a collaborative way, and they are collectively responsible changes that allow them to be referred to a set of principles and shared values" (Watkins and Marsick, 1992).

Kim (1993) observed in these studies that all organizations learn only if they choose it consciously. It concluded that what is important for a company, in strategic terms, not the speed of learning, learned things, or people who learn, but how the information is used, processed and transferred in knowledge within the company. The fact that some companies continue to stand even in situations of economic

uncertainty, while others decline, is proof that businesses depend on their ability to learn and adapt (Spekman et al. 2002).

For Senge (1990), the basic logic of such organizations is that in a situation of rapid change, only those that are flexible, adaptive and productive will succeed. To do this, they need to "discover how to harness the commitment and learning capabilities of all individuals at all levels." For him, that all individuals have an ability to learn, the structures in which they operate may not be incentive for reflection and commitment. Especially since they may lack tools and ideas to enable them to make sense of the situations they face. Organizations that spend their ability to consistently create their future require a fundamental change in attitudes of their members.

Peter Senge (1990) adds that the real learning is one that goes to the bottom of what is human, and that when individuals and organizations become, somehow able to recreate and rebuild. Thus, for a learning organization, it is not just about survival. "Learning to survive" or what is commonly called "adaptive learning" is certainly important, but this needs to be accompanied by a "generative learning", learning that enhances the ability of individuals to create.

Senge (1992) states that the dimension that distinguishes a learning organization is another traditional mastery of certain disciplines or certain technological components. Senge (1990) describes five disciplines that represent long-term programs that include both personal and organizational learning. These five disciplines are as follows:

- Control personal: People learn to spend their own personal capacity to create the best result they want. Employees also create an organizational environment that encourages their peers to develop to the objectives and goals they want.
- Challenging mental models: These include the reflection of each individual, his permanent enlightenment, as well as improving its internal vision of the world, and this allows them to see how their actions and personal decisions are made.
- The shared vision: This includes building a sense of commitment in a particular work group, and developing shared images of a common future, and principles and practical guidelines to support the need for such a future.

- Team learning: That is to say access to important thinking skills in order to allow a group of individuals to develop some intelligence and a synergistic power that are more important than the sum of those arranged by the individuals in question.

- Systems thinking: use a mode of reflection, and a description language and understanding of all the forces and interrelationships that shape the behavior of the entire organization as a system.

All these disciplines should help guide the organization to the latest and is the fifth discipline that is systems thinking. That is to say that attitudes have evolved from a narrow focus in terms of parties to a broader vision in terms of the whole constituted by all these parties and the interactions that occur between them.

First, it should be noted that in this point, we will not go into detail of systems thinking, as it was presented by Peter Senge. However, it would be interesting to show how this idea could be more in the analysis of a learning organization. For Senge (1990), this discipline is presented as the cornerstone of all the other disciplines because it integrates them all together into a coherent set of theories and practices. System thinking enables us to grasp and understand it all, and also to examine all its parts and the interrelations that occur between them, so that thought gives us the meanings and motivations of the integration of all disciplines.

System thinking helps first to understand it all as a whole and the interrelations between all its parts, in order to allow individuals within the organization in question to see beyond the immediate context and incorporate the impact of their own actions on others, and also those of others on themselves. Second, since the construction component of a systems thinking is relatively simple, it allows, contrary to what organizations do today, people to develop models that are relatively complex and sophisticated. Senge (1990) states that for complex systems such as organizations, the use of simplistic models may cause blurred vision on the real situation of the organization. Thus, when one has a good vision at all, which is higher than that of all the parties as it considers the interrelationships between these parties, and also when adopting a complex vision, not simplistic, reality, it could benefit from a better appreciation of the systems that make up the organization, and who will have access to appropriate action. Finally, systems thinking can make sense of the mechanisms of action and reaction within the organization, and

thus to learn and to identify the tacit knowledge and allow their transfer and capitalization, and this always a complex approach.

This systemic vision leads us to an interesting observation. Since:

- The environment in which organizations are complex, and thus requires a complex vision,
- All parties within a system are necessarily interdependent,
- The interactions between these parties are as important as the parties themselves,
- The organization is greater than all these parties,
- There is a very close relationship between what emerges and those that do emerge,
- Tacit knowledge is the strategic knowledge in the organization,
- Tacit knowledge is the result of an emerging internal mental schema of an individual,

So we can say that an organization can have tacit knowledge that emerge from the interaction between tacit knowledge, explicit knowledge among or between tacit and explicit knowledge. These emergences are not necessarily formalized or known in an explicit way. Consequently, we can talk about funding, because the capitalization, in my opinion for knowledge that is already given, or at least have a simplified approach, that is to say, to capitalize on knowledge, we need to explain, but the goal is not that of simplification, but rather the apprehension of this knowledge in their complexity. So the concept is best suited, in my opinion, is the memory, which is a dynamic concept unlike that of capitalization, in the sense that it allows capitalization intelligent and complex, are integrated into the development process, which is knowledge, but also those that have given rise, that is to say individuals in question. In addition it provides a reality check on management of knowledge, for example by introducing the notion of oblivion. It also allows to introduce the concept of intelligence, as for the creation of tacit organizational knowledge, it is sufficient to use organizational memory through organizational intelligence so well on contextuality of knowledge stored for use more objectified.

ORGANIZATIONAL MEMORY AND ORGANIZATIONAL KNOWLEDGE CREATION

The concept of organizational knowledge is a concept that has become widely used in the literature because it is an instrument very significant and very expressive in explaining the nature of organizations and their behavior (Kogut and Zander, 1996). The company can be described as a "knowledge warehouse" that are embedded in assets, rules, routines, standard operating procedures in, and the

dominant logics (Martin de Holan et al., 2004). In addition, several studies claim that to have a sustainable competitive advantage and sustainable, the company must have fundamentally organizational knowledge, and at the same time be able to create new ones more suited to the contexts of (Kogut and Zander, 1992).

Grant (1996) goes further by saying that the primary role of companies, and the essence of their capabilities, is the integration of knowledge. To him, companies exist because it can integrate and coordinate specialized knowledge held by individuals in a manner more efficient than markets, and because they can transform individual knowledge into collective knowledge, in other terms in organizational knowledge. This knowledge is difficult to copy enable the company to be free of its competitors, holding a sustainable competitive advantage, provided of course that it is able to produce more knowledge to speed changes in its competitive environment.

It is recognized in the literature that organizational knowledge is embedded in a kind of organizational memory that does not disappear with the movement of individuals (Martin de Holan et al., 2004). The organizational knowledge does not belong to the individuals who constitute it purports to be a property separate from the organization as a social q'acteur (Ghoshal and Moran, 1996). Thus, organizational memory is presented as an organizational system that requires a central storage, or rather a result of storage of knowledge produced by the process of organizational learning, in simpler terms, learning can be seen as the development of organizational memory (Cross et Bayrd, 2000). For Stein (1995), all current conceptualizations of organizational memory is mainly based on the work of Walsh and Ungson (1991), and define organizational memory as the set of information stored from the history of the organization so that they can be used in the current decision. Organizational memory consists of a series of stimulus decision kept in a kind of "memory boxes" and have behavioral consequences when they are used (Walsh et Ungson, 1991).

In general, all studies on organizational memory, are studies that have tended to theorize on a large scale, yet they are not based on empirical work, which makes it difficult to identify the variables measuring (Ackerman and Halverson, 1999). Huber (1991), states that the support of a corporate memory analysis is certainly useful, but all the work does not clearly distinguish what constitutes the corporate memory. As Stein and Zwass (1995) recognized the need for empirical studies in this area, and

this based on a model of the organization on a large scale. For Ackerman and Halverson (1999), most studies on organizational memory have largely focused on a set of technological systems designed to replace the physical and human factors relating thereto. These studies were very limited in view of the definitions too reductionist memory and organizational tasks. So it would be interesting to examine the human side of this issue, because the trend today is more oriented towards standardization, but rather is directed towards the personalization of knowledge to transform them into idiosyncratic memory.

CONCLUSION

In conclusion we could say that there is a growing interest in the concepts studied in this work, namely organizational learning, tacit knowledge and organizational memory. These concepts must be understood in a systems approach to allow them the true meaning they have, and also to make them interact in a common system. In this work, we tried to show that an organization as an individual interacts with its environment, with its partners, its competitors, but also with the individuals that constitute it, she has skills she learned and has as a memory, and all its features are unique to it as a social actor. In the same line of Spender and Grinyer (1995), we can say that the firm is conceptualized as a whole, as a community of practice with institutional dimensions that gives meaning to these practices, rather that as a system of market resources under the explicit control of managers. The resulting model, is a company designed as a dynamic, self-reference and which is partially responsive to managerial influences.

REFERENCES

[1] Hamel, G., and Prahalad C.K., 1990, “The core competence of the corporation”, Harvard business review, 68, No 3, 79–91.

[2] Wernerfelt, B. 1984, “A resource-based view of the firm”, Strategic management journal, 171–180.

[3] Forrester, J. W. 1958, “Industrial Dynamics: A Major Breakthrough for Decision Makers”, Harvard Business Review, 36, No 4, 37-66.

[4] Porter, M.E., 1986, “Competition in Global Industries”, Harvard Business School Press, 1.

[5] Miles, R.E., and Charles C.S., 2007, “Organization theory and supply chain management: An evolving research perspective”, Journal of Operations Management, 25, No 2, 459-463.

[6] Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D. and Zacharia, Z.G., 2001, “Defining supply chain management”, Journal of Business Logistics, 22, No 2, 1-25.

[7] Ellram, L. M. and Cooper, M.C., 1990, “Supply chain management, partnerships, and the shipper-third party relationship”, International Journal of Logistics Management, 1, No 2, 1-10.

[8] Smith, A. 1937, “An Inquiry into the Nature and Causes of the Wealth of Nations”, (1776). Methuen.

[9] Nelson, R.R., 1991, “Why do firms differ, and how does it matter?”, Strategic management journal, 61–74.

[10] Schumpeter, J. A. 1934. “The theory of economic development”, Springer.

[11] Williamson, O. E., 1979, “Transaction-cost economics: the governance of contractual relations”, The journal of Law and Economics, 22, No 2, 233.

[12] Lado, A.A, Boyd, N.G. and Hanlon S.C., 1997, “Competition, cooperation, and the search for economic rents: a syncretic model”, Academy of Management Review, 110–141.

[13] Bernard-Weil, E., 1988, “Précis de systémique ago-antagoniste: introduction aux stratégies bilatérales”, L'interdisciplinaire.

[14] Brandenburger, A. M, and Nalebuff, B.J., 1996, “Co-Opetition: A revolution mindset that combines competition and cooperation: the game theory strategy that's changing the game of business”, Bantam Dell.

[15] Coase, R. H., 1937, “The nature of the firm”, Economica, 386–405.

[16] Clemons, E. K., Reddi, S. P. and Row, M.C., 1993, “The impact of information technology on the organization of economic activity: the "Move to the middle" hypothesis”, Journal of Management Information Systems, 10, No 2, 9-35.

[17] Cooper, M.C., Ellram, L.M. Gardner, J.T. and Hanks, A.M., 1997, Meshing multiple alliances, Journal of Business Logistics, 18, No 1, 67-89.

[18] Lambert, D.M., 2001, “Supply chain management: what does it involve”, Supply Chain and Logistics Journal, 4.

[19] Lambert, D.M. ans Cooper M.C., 2000, “Issues in Supply Chain Management”, Industrial Marketing Management, 29, No 1, 65-83.

[20] Naylor, J. B., Naim, M.M., and Berry D., 1999, “Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain”, International Journal of Production Economics 62, No 1-2, 107-118.

[21] Christopher, M., Peck, H. and Towill, D., 2006, “A taxonomy for selecting global supply chain strategies”, The International Journal of Logistics Management, 17, No 2, 277-287.

[22] Fabbe-Costes, N., 2007, “La gestion de la chaîne logistique multi-acteurs : les dimensions organisationnelles d'une gestion lean et agile”, In La gestion de la chaîne logistique multi-acteur : perspective stratégique, Grenoble: PUG.

[23] Christopher, M., 2000, “The agile supply chain competing in volatile markets”, Industrial marketing management, 29, No 1, 37–44.

[24] Van Hoek, R.I., Harrison, A. and Christopher M., 2001, “Measuring agile capabilities in the supply chain”, International Journal of Operations and Production Management, 21, No 1/2, 126–147.

[25] Hoekstra, S., Romme, J. and Argelo, S.M., 1991, “Integral Logistic Structures: Developing Customer-Oriented Goods Flow”, Industrial Press, Inc.

[26] Von Bertalanffy, L., and Sutherland, J.W., 1974, “General systems theory: Foundations, developments, applications”, IEEE Transactions on Systems, Man and Cybernetics, 4, No 6, 592-592.

[27] Bernard-Weil, E., 2003, “Théorie et praxis des systèmes ago-antagonistes”, Res-Systemica, 3, No 1-2.

[28] Bernard-Weil, E., 2002, “Ago-antagonistic systems”, In Quantum mechanics, mathematics, cognition and action: proposals for a formalized epistemology, 325-348. Kluwer Academic Publishers.

[29] Bernard-Weil, E., 2002, “Approche des systèmes ago-antagonistes”, Techniques de l'ingénieur, L'Entreprise industrielle, No AG 1575: 1575–1575.

[30] Bernard-Weil, E., 1999, “La théorie des systèmes ago-antagonistes”, Le Débat(Paris. 1980), No 106, 106–120.

[31] Mason-Jones, R., Naylor, B. and Towill, D.R., 2000, “Lean, agile or leagile? Matching your supply chain to the marketplace”, International Journal of Production Research, 38, No 17, 4061–4070.

[32] Rothaermel, F.T, Hitt, M.A. and Jobe L.A., 2006, “Balancing vertical integration and strategic outsourcing: effects on product portfolio, product success, and firm performance”, Strategic Management Journal, 27, No 11, 1033–1056.

[33] Lambrechts, O., Demeulemeester, E. and Herroelen, W., 2008, “Proactive and reactive strategies for resource-constrained project scheduling with uncertain resource availabilities”, Journal of Scheduling, 11, No 2, 121–136.

[34] Dagnino, G. B, and Padula, G., 2002, “Coopetition strategy: a new kind of interfirm dynamics for value creation”, In Innovative Research in Management, European Academy of Management (EURAM), Second Annual Conference, Stockholm, May 9.

[35] Cachon, G. P, and Netessine, S., 2006, “Game theory in supply chain analysis”, Tutorials in Operations Research: Models, Methods, and Applications for Innovative Decision Making.

[36] Swaminathan, J. M, Smith, S.F. and Sadeh, N.M., 1998, “Modeling supply chain dynamics: A multiagent approach”, Decision Sciences, 29, No 3, 607–632.

[37] Marchi, E., Cohen, P.A. and Garcia-Cestona, M., 2009, “Cooperative game theory solution in an upstream-downstream relationship”, IMA Preprint Series.

[38] Rasmusen, E., 2006, “Games and Information: An Introduction to Game Theory”, 4 ed. Blackwell Publishing Ltd.

[39] Brandenburger, A. M, and Nalebuff, B.J., 1995, “The right game: use game theory to shape strategy”, Harvard Business Review, 73, 57–57.

[40] Armstrong, J.S., 1997, “Why can't a game be more like a business? A review of Co-opetition by Brandenburger and Nalebuff”, Journal of Marketing, 61, 92–95.

[41] Gee, E.P., 2000, “Co-opetition: the new market milieu”, Journal of healthcare management/American College of Healthcare Executives, 45, No 6, 359.

[42] Hall, N.G, and Potts, C.N., 2003, “Supply chain scheduling: Batching and delivery”, Operations Research, 566–584.

[43] Ballou, R. H, Gilbert, S.M. and Mukherjee, A., 2000, “New managerial challenges from supply chain opportunities”, Industrial Marketing Management, 29, No 1, 7–18.

[44] Ghosh, M., and John, G., 1999, “Governance value analysis and marketing strategy”, The Journal of Marketing, 131–145.

[45] Spalanzani, A. and Samuel, K.E., 2007, “Absorbing uncertainty within supply chains”, International Journal of Productivity and Quality Management, 2, No 4, 441–458.

[46] Carlton, D.W., Perloff, J.M. and Mazerolle, F., 1998, “Economie industrielle”, De Boeck Université.

[47] Zhang, F., 2006, “Competition, Cooperation, and Information Sharing in a Two-Echelon Assembly System”, Manufacturing & Service Operations Management, 8, No 3, 273-291.

[48] Subramani, M., 2004, “How do suppliers benefit from information technology use in supply chain relationships”, MIS Quarterly, 28, No 1, 45–73.

[49] Richardson, J., 1993, “Parallel Sourcing and Supplier Performance in the Japanese Automobile Industry”, Strategic Management Journal, 14, No 5, 339-350.

[50] Dubois, A. and Fredriksson, P., 2008, “Cooperating and competing in supply networks: Making sense of a triadic sourcing strategy”, Journal of Purchasing and Supply Management, 14, No 3, 170-179.

[51] Qi, F., Xuejun, X. and Zhiyong, G., 2007, “Research on Lean, Agile and Leagile Supply Chain”, International Conference in Wireless Communications, Networking and Mobile Computing, WiCom 2007, 4902–4905.

[52] Chin, K., 2001, “In the spirit of "coopetition"”, Chemical Engineering Progress. http://findarticles.com/p/articles/mi_qa5350/is_200105/ai_n21472701/pg_2/?tag=content;col1.

[53] Cachon, G. P. and Zipkin, P.H., 1999, “Competitive and cooperative inventory policies in a two-stage supply chain” Management science, 45, 936–953.

[54] Wong, H., Van Oudheusden, D. and Cattrysse, D., 2007, “Cost allocation in spare parts inventory pooling”, Transportation Research Part E: Logistics and Transportation Review, 43, No 4, 370-386.