

Title	A Novel Approach to the Combination of Knowledge Flow with Organizational Learning Process
Author(s)	Donghua, Pan; Wenqi, Dai
Citation	
Issue Date	2005-11
Type	Conference Paper
Text version	publisher
URL	http://hdl.handle.net/10119/3927
Rights	2005 JAIST Press
Description	The original publication is available at JAIST Press http://www.jaist.ac.jp/library/jaist-press/index.html , IFSR 2005 : Proceedings of the First World Congress of the International Federation for Systems Research : The New Roles of Systems Sciences For a Knowledge-based Society : Nov. 14-17, 2137, Kobe, Japan, Symposium 6, Session 6 : Vision of Knowledge Civilization Society and Knowledge



A Novel Approach to the Combination of Knowledge Flow with Organizational Learning Process

Donghua Pan, Wenqi Dai

Institute of Systems Engineering, Dalian University of Technology
Dalian, 116024, China

ABSTRACT

Knowledge is becoming one of the most important factors for organizations (especially knowledge intensive ones) to keep their predominance of high competencies. This paper proposes a new approach to bringing knowledge flow into knowledge management system (KMS), through which the organizational learning could be better supported. Knowledge flow is an effective assistant for knowledge acquisition, sharing, reposition and generation (the key functions of KMS) in an organization. According to the usual notion that organizational learning could be divided into two types, internal learning and external learning, this paper presents a way to combine knowledge flow with KMS in common knowledge-based organizations, and we basically focus on the combination between knowledge flow and four domains of internal learning: individuals learning, intra-functional, inter-functional and multilevel learning, through which we improve the organization's structure and core competency in the changeful environment.

Keywords: Knowledge flow, knowledge management, internal learning, organization reengineering, etc.

1. INTRODUCTION

In recent decades, as the world's developed economies have entered an era in which firms rely more on intellectual capital, also called knowledge. These firms, as we called knowledge-based organizations, take knowledge as their critical resource and even conceptualize it as central to competitive advantage in a knowledge-based view of the firms.^[2,3,4] Therefore the management of knowledge with KMS has commanded increasing levels of resources. KMS takes charge of most things about knowledge acquisition, sharing, reposition and generation (also called creation) within an organization and between them.

As we know that knowledge is divided into two types commonly, tacit knowledge and explicit knowledge. The latter can be captured and used easily while tacit knowledge which is more important to organizations is becoming a focus and difficulty of knowledge

management. Experience of both academics and practitioners during last several decades shows that organizational learning is able to do an excellent job on tacit knowledge. A large number of articles in professional periodicals describing the design and management of learning organizations attest to the popularity of organizational learning and knowledge management among practitioners. New theories of knowledge creation have become prominent (Nonaka, 1994; Raelin, 1997), and formal knowledge management programs have been undertaken in many companies (Davenport, De Long & Beers, 1998). Organizational learning promises to be a dominant perspective with influence on both organizational research and management practice (Argyris & Schön, 1996). However, organizational learning has such diverse origins, it is unlikely that a uniform understanding of organizational learning will ever be shared widely. Therefore we will take a whole paragraph to illustrate the organization learning that we talking about here later.

Knowledge management has captured the attention of firms as one of the most promising ways for organizations to succeed in the information age. At least two challenges present themselves in today's economy causing firms to take an increased interest in knowledge management. One is an aging work force, the other is a rapid advance in technology. In a white paper^[1], SAP (2000) states KM's mission as: To connect those who know with those who need to know; To convert personal knowledge to organizational knowledge. However, as one of O'Leary books suggest that knowledge management includes those efforts designed to capture knowledge; to convert personal knowledge to group-available knowledge; to connect people to people, people to knowledge, knowledge to people and knowledge to knowledge; and to measure that knowledge to facilitate management of resources and help understand its evolution.

2. ORGANIZATIONAL LEARNING AND KNOWLEDGE FLOW

2. 1. Organizational Learning

Although Organizational Learning already had its roots several decades ago as Argyris termed “action science” and action learning, of which the focus was on individuals more than teams or groups; and Argyris’ definition^[5] on OL ten years later addressed the group or cultural dimensions of organizations more explicitly, that is the process of “detection and correction of errors”-- Organizations learn through individuals acting as agents for them. The individual’s learning activities, in turn, are facilitated or inhibited by and ecological system of factors that may be called an organizational learning system.

However, not until 1990s has organizational learning enjoyed a boom among both academics and practitioners seeking to improve organizations. New theories of knowledge creation have come up and formal knowledge programs have been undertaken in many companies. As Huber^[6] clarifies that learning need not be conscious or intentional. He considers four constructs as integrally linked to organizational learning: knowledge acquisition, information distribution, information interpretation and organizational memory. From a behavioral perspective, Huber notes: An entity learns if, through its processing of information, the range of its potential behaviors is changed. And almost the same time, Weick^[7] notes this: Perhaps organizations are not built to learn. Instead, they are patterns of means-ends relations deliberately designed to make the same routine response to different stimulus, a pattern which is antithetical to learning in the traditional sense. He further argues that a more radical approach would take the position that individual learning occurs when people give a different response to the same stimulus, but organizational learning occurs when groups of people give the same response to different stimulus. Also, McGill et al. define organizational learning as the ability of an organization to gain insight and understanding from experience through experimentation, observation, analysis and a willingness to examine both successes and failures. As for the practitioners, Japanese organizations^[8] even automobiles organizations which are often very hierarchical and of which the environments are traditionally considered to be fairly stable could be the paradigms. They are well-known for their external and internal learning activities; an important part of their strategies is the relentless gathering and analysis of external information and the efficient sharing of intra-organizational knowledge. More and more

evidence shows that organizational learning promises to be a dominant perspective with influence on both organizational research and management practice^[9].

Here we make a declaration of our viewpoint as Senge^[10] has noted: “the rate at which organizations learn may become the only sustainable source of competitive advantage”. So it is essential to know how we could accelerate the rate of organizational learning. Many pioneering works on OL have designed lots of solutions and suggestions for this question and others quite similar like this. Built upon these shining cornerstones, we here have got an answer, that is to enhance the collective competencies of employees in an organization through improvements of organizational learning, which means trying to discover what works best both for individuals and organizations. Concretely speaking, we try to incorporate knowledge flow with organizational learning process in this paper. While in this section we make a description of organization structure and organization learning process in our opinion, which is important and helpful for the understanding of the context. We all know that OL is a matter of the crew all over the organization, from the top management to the workers, in other words, OL has a delicate relationship with organization’s strategy. As Mintzberg says, the key is not getting the right strategy but fostering strategic thinking. Therefore, we divide OL into two strategically relevant categories, external and internal, which involve complementary processes with separate advantages and disadvantages.

As Figure 1 shows that there are four domains at the external organizational environment which are strategically relevant with each other. Among them, networks stands in a pivotal position like a bridge between the organization and the other three domains, customers, competitors and institutions. Also, there are kinds of relations among the other three domains. As for internal learning, individual learning, intra-functional, inter-functional and multilevel learning are distributed in the organization logically and hierarchically. Thus, it is important for the top management to lead the OL process by identifying and allocating resources to the crucial domains, by which to provide the necessary organizational capabilities to achieve a sustainable competitive advantage.

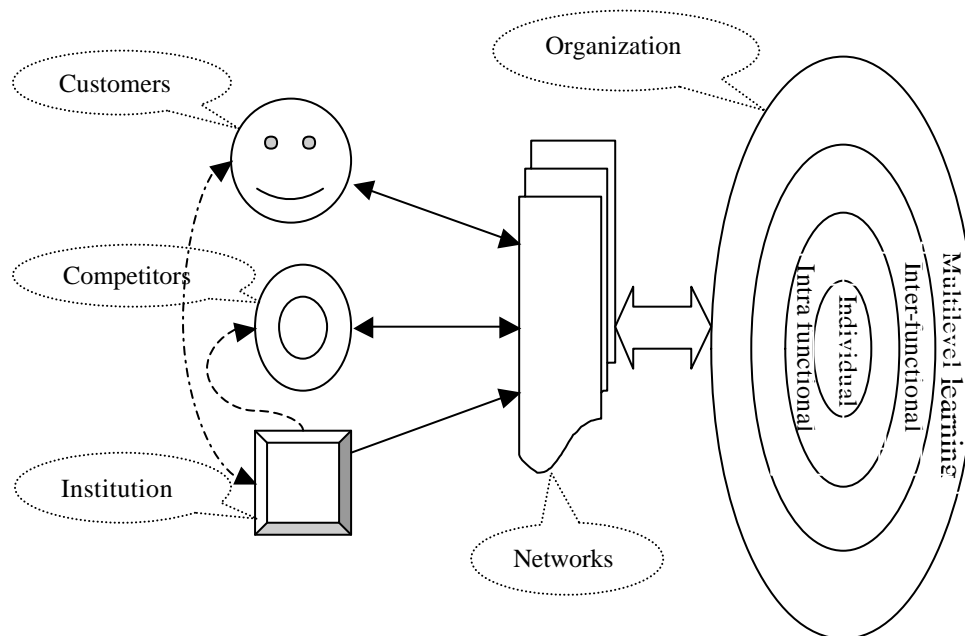


Fig.1. External/Internal Organizational Environment

2. 2. Knowledge Flow

As we have mentioned above, knowledge is becoming a more critical resource in the modern enterprise gradually. However, knowledge is not evenly distributed through the organization, therefore to capitalize on this resource for enterprise performance depends upon its rapid and efficient transfer from one organization, location or time of application to another. From a technological perspective, such dynamic dependence points immediately to the design of information systems (IS)—along with corresponding organization and process characteristics^[11, 12] -- to enhance knowledge flow.

As a lot of extant literatures define that a workflow is a mechanism that supports work cooperation among team members according to definite process logic. And accordingly there is a system^[13] (WFMS, workflow management system) that completely defines, manages and executes the workflow specification through the execution of software. By analog, a knowledge flow is defined as a carrier of human knowledge, which passes a team member's knowledge to the succeeding team member according to definite process logic. Nevertheless, differences between the two flows are obvious. Firstly, the flow content, workflow's reflects domain business and is pre-designed by its designer while knowledge flow's generates from the team member's task implementation process during the execution of the

workflow process and cannot be pre-designed. Secondly, a workflow reflects relationship of data or execution dependence between tasks while a knowledge flow carries knowledge of team members.

Within an organization, which needs a flexible logical structure or some agile workflow processes, a complete knowledge flow network helps a lot. These flows pass through almost every departments and even members during the whole project and the KF Network is approximately a mapping image of the according workflow process of the project. There are logical nodes distributing among the networks and every this knowledge node represents the generation of the corresponding team members' knowledge during their task implementation process. The output of a knowledge node is a knowledge flow that depends on the corresponding team member's cognitive ability and this node's input flow. Usually, there are two statuses for a knowledge node, active or inactive. We call a knowledge node active only when the corresponding team member is working on it and otherwise we call it inactive. Besides, an inactive node can be re-active again when the corresponding team member is working on it. As for the propagation of the active nodes on the KFN, they usually keep pace with the execution of the corresponding workflow process.

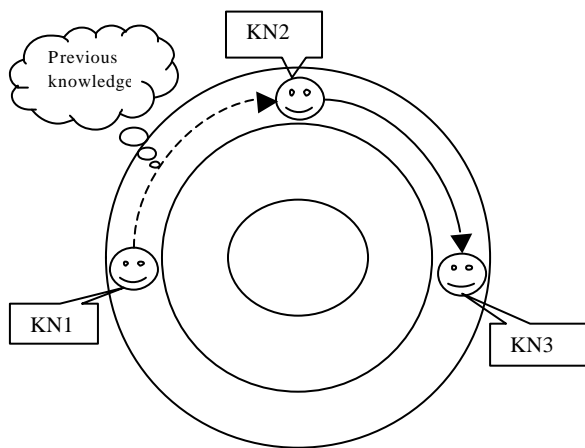


Fig.2. Informal Knowledge Flows. KN1, KN2, KN3 are on the same level within an org.

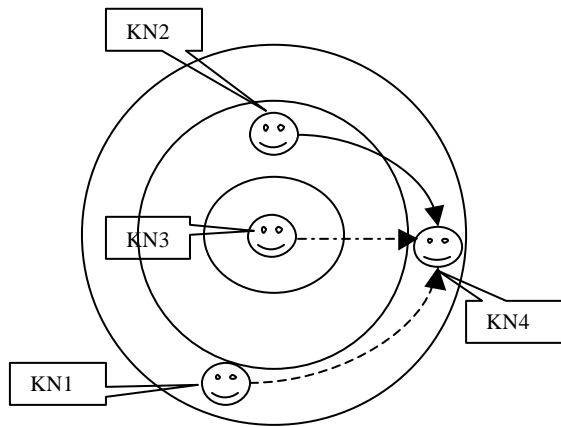


Fig.3. Collaborative Knowledge Sharing. KN1, KN2, KN3 are different levels within an org.

Knowledge flows encompass both informal knowledge flows and collaborative knowledge sharing. Informal knowledge flows (Fig.2) are defined as the transfer of previously existing knowledge from one inventor to another for use in the creation of new knowledge, while collaborative knowledge sharing (Fig.3) is defined as the knowledge flows or knowledge exchange occurring when inventors from different institutions, or different units within the same organization, engage in joint research. Furthermore, knowledge flow management is the management of a knowledge flow during a project, like execution, control, storing and maintaining. A KF execution control mechanism is responsible for monitoring and scheduling and knowledge flow passing process. During some certain project, knowledge flow process should keep pace with the workflow process, which is the contribution of this mechanism. Team members should accomplish the job to fill their

knowledge into the according knowledge nodes and then the flow frame, in order to refresh the knowledge flow and pass knowledge to the members or nodes which need that. To realize the execution control, we could consider to incorporate the knowledge flow into the corresponding workflow process. In this way, we can not only assist the workflow with a brand new thought but make full use of the existing WfMS to help the knowledge flows management and even cognitive flows management.

2. 3. Internal Learning Process on Knowledge Flow

Now that we have a clear view of the organizational learning and knowledge flow mentioned in this paper, it is helpful for us to understand the important role that the knowledge flow could be in a learning process especially internal learning process as we discussed here. As lots of extant articles have defined, we here cite the common notion that organizational learning takes place at four external relevant domains of the organizational environment: customers, competitors, networks and institutions while internal learning includes individual, intra-functional, inter-functional and multilevel learning. Generally, as Ordonez de Pablo notes that the ways of internal learning may be to learn from others' experience, organizational knowledge and organizational repository (such as documents and database), and our goals are to make these experience, knowledge and repository transferred to those who need them as soon as possible through the knowledge flow. Meanwhile learning from the external environment means acquiring knowledge from alliance partners, competitors, competitors' customers and suppliers, government bodies, headquarters, media and so on. There are so many distinct kinds of ways for organization to learn with, which is actually the reason why we don't incorporate knowledge flows into the external learning here. As a further imagination, we speculate that at least some knowledge networks maybe help a lot with external learning process.

The most basic units of an organization are individual members, and so individual learning is the base of organizational learning. Like Argyris & Schon's notion^[14] says, it is not necessarily certain that organizations automatically learn when the employees within them have learned something but the managers should absolutely bear in mind that organizations could only learn while their members learn. In other words, organizational learning occurs through individual, but it is more than the cumulative result of organizational members' learning only if the organization had a nice KM system like the knowledge flow mechanism here for example. Because the members gain knowledge from others, their group, other groups and the environment,

power structure. Often, for new ideas to become accepted by different coalitions, a “champion” of the idea is needed to break down the resistance to change^[18]. On the other hand, knowledge^[19], primarily strategic and administrative in nature, also flows from top level down to lower levels of the organization. This type of learning is crucial if the individual, intra-functional and inter-functional learning are to be consistent with the strategic direction of the firm. Moreover, the successful implementation of strategies depends on the efficacy of these knowledge flows.

According to the four domains of internal learning, as illustrated in the figure (Fig.4) below, we divide the internal knowledge flow's nodes into four levels: top node, inter-functional nodes, intra-functional nodes and individual nodes. Except those individual nodes, each of the other nodes has its administrator to ensure the flow's smooth operation. Under this structure, like we have discussed above, most technical knowledge captured at the individual nodes is filtered, interpreted, summarized and communicated through the nodes' administrators up to the top node administrator (e.g. the CKO of a firm) and then the top management. Meanwhile, strategic and administrative knowledge also flows from top management down to the lower level nodes. It is critical for intra-functional nodes' administrators to provide a way for individual nodes' communication and to satisfy the demands of knowledge from individual nodes, such as chat room or BBS system. And the individual node has to apply for the admission to access other nodes belong to other intra-functional node or higher level nodes. Also there is a similar relation between intra-functional nodes and inter-functional nodes. In detail, the real lines with arrow between inter-functional nodes and intra-functional nodes, also between intra-functional nodes and individuals stand for direct knowledge transfer from the head; while those dashed lines which are reversed to the real ones stand for a demand of permit to access other nodes.

3. CONCERNS ON the KF IMPLEMENTATION

Although we have presented the four domains of internal learning as the basic frame to create internal knowledge flow networks, we still need to understand the importance of knowledge flows' implementation at intra-functional level and inter-functional level, that is how knowledge flows through the modern organization and also what kinds of managerial interventions (e.g. IS development, training, organizational change, workflow reconfiguration) can be made to enhance the knowledge flow. A number of literatures have described theoretical models of knowledge flows' implementation under their

supposed circumstances. A notable step is taken in 1994 by Bon Hippel^[20], which gives a better understanding about how knowledge flows. He examines causal factors for the relative marginal costs—characterized by the term *stickiness*—associated with transferring tacit and explicit knowledge for technical innovation problem solving. Also Szulanski^[21] goes further with the “stickiness” notion incorporated into four different stages of the knowledge-transfer process (i.e., initiation, implementation, ramp-up, integration). He seeks to explain why companies find it difficult to transfer knowledge, in the case “best practice”, internally, which is one that is performed in a superior way in some part of an organization and is deemed better than alternate practices used by or known to the rest of the company. Nonaka^[22] goes further with his model describing a “spiral” of dynamic interaction between tacit and explicit knowledge along an epistemological dimension, and he characterizes four processes (i.e., socialization, externalization, combination, integration) that enable individual knowledge to be “amplified” and effect organizational knowledge “crystallization” along the ontological dimension.

However, as shown in the figure above, here we present the exact way to embed the knowledge flow into an existing structured organization, that we improve the organizational structure logically according to the existing organizational structure or operations with their certain workflows. With this improvement, individuals can get the knowledge they need very quickly, including the normal explicit knowledge such as documents, records from the knowledge repository and others' experience through the knowledge nodes; and the requisition for an access permit policy makes sure of the organization's safety, also, the political and strategic knowledge could be passed down smoothly with the help of knowledge flow, because there's no need for permit. As for the administrator of the knowledge nodes, we borrow the idea of knowledge council^[23] as a solution. At first, we set a position of ‘knowledge officer’ who manages the knowledge management of the organization and of course is the administrator of the top management node. Well, the best chance for success will be if the knowledge officer pulls together a team of people (knowledge council) who collectively understand the enterprise's knowledge offerings and needs. The members of the team^[24] should represent various groups within an organization that produce and consume the knowledge. It is important to recognize that the council will focus on the knowledge flow across organizational boundaries. The details of the storage and maintenance of the knowledge should be of concern only to the producers/maintainers of the knowledge. The council will produce a high level architecture for the enterprise

knowledge describing how the knowledge is organized within the enterprise and characterize the access mechanisms available to retrieve the knowledge.

As we have mentioned and described in the figure above, the interaction between an organization and its environment is also very important for the organization. With the globalization's booming, the environment nowadays is becoming more and more changeful, unstable and unpredictable. So the organizations have not only to construct their internal learning system, but to make them adaptive to their external environments. That is the basic requirement to survive for the modern organization and also why the external learning is becoming more critical. External learning takes place primarily through certain boundary spanning people in the organization that exchange information with the organization's environment. The boundary spanning individuals need to have a strong network of external and internal connections; the latter are necessary for them to transfer the external information to other members within the organization^[25].

As we know that organization reengineering and organization core competency are two main sides of Knowledge Management^[26].so we try to combine knowledge flow with the corporation's operation flows, which will certainly help the implement of organization reengineering. Apparently the improvement of organizational learning process and the optimization of organization reengineering process will help the organization's KM a lot.

4. CONCLUSION

Based on lots of pioneers' notions and literatures, we make a preliminary attempt to combine the knowledge flow with organizational learning in this paper, through which to improve the organization's ability to learn in order to maintain its competence advantages. According to extant articles, we divide organization learning into two strategically relevant categories, external and internal, which are complementary processes. External learning focuses on four relevant domains of the organization environment: customers, competitors, networks, and institutions. While internal learning includes individual, intra-functional, inter-functional and multilevel learning. However, in this paper we attach more importance on the internal learning, we set four levels of knowledge nodes according to the four aspects of internal learning, individual nodes, intra-functional nodes, inter-functional nodes and top management nodes, and every nodes from intra-functional nodes upon are assigned an administrator each. These administrators

consist of a knowledge council to charge for knowledge management system and the organizational learning. Although we don't discuss too much on external learning, we yet realize how important that role is. And the role is becoming more critical as modern competition requires rapid innovation and upgrading driven by organizational learning processes^[27]. Helped by this knowledge flow assistant, organization could do a better job at both internal learning and external learning, nevertheless, to be most effective, the top management should understand the management of organizational learning processes.

REFERENCES

1. Cole, R.E. "Introduction," *California Management Review* 45:3 (Spring 1998), pp. 15-21.
2. Grant, R.M., "Toward a Knowledge-Based Theory of the Firm," *Strategic Management Journal* 17 (1996), pp. 109-122.
3. Spender, J.C. "Making Knowledge the Basis of a Dynamic Theory of the Firm," *Strategic Management Journal* 17 (1996), pp. 45-62.
4. Knowledge management across the enterprise resource planning systems life cycle Daniel E. O'Leary Marshall School of Business, University of Southern California, 3660 Trousdale Parkway, Los Angeles, CA 90089-1421, USA
5. Argyris, C., 1977, "Organizational learning and management information systems", *Accounting, Organizations, and Society*, Pergamon Press, Oxford.
6. Huber, G. P. 1991. Organizational learning: The contributing processes and the literatures. *Organization Science*, 2(1): 88-115.
7. Weick, K. E. 1991. The nontraditional quality of organizational learning. *Organization Science*, 2(1), 116-123.
8. Imai, K., Nonaka, I. and Takeuchi, H., *Managing the new product development process: how the Japanese companies learn and unlearn*. In: Clark, K. B., Hayes, R. H. and Lorenz, C.(Eds.), *The Uneasy Alliance* (Cambridge, MA: Harvard Business School Press, 1985).
9. David Malone. Knowledge management A model for organizational learning. *International Journal of Accounting Information Systems*, 2002 (3): 111-123.
10. Senge, P. M. (1990). *The fifth discipline. The art and practice of the learning organization*. New York: Doubleday.
11. Davenport, T.H., *Process Innovation: Re-engineering Work through Information Technology* Boston, MA: Harvard University Press

- (1993).
12. Leavitt, H.J. "Applying organizational change in industry: structural, technological and humanistic approaches," in J. March (Ed.), *Handbook of Organizations* Chicago, IL: Rand McNally (1965).
 13. Wfmc, The workflow reference model, <http://www.wfmc.org>.
 14. Argyris, C., & Schon, D. A. (1978). *Organizational learning: A theory of action perspective*. USA: Addison-Wesley.
 15. Kotler, P., Fahey, L. and Jatusripitak, S., *The New Competition* (Englewood Cliffs, NJ: Prentice-Hall, 1985).
 16. Mintzberg, H., *The effective organization: forces and forms*, *Sloan Management Review* (1991), pp. 54-67.
 17. Porter, M. E., *Competitive Advantage* (New York: Free Press, 1985).
 18. Maidique, M. A., *Entrepreneurs, champions, and technological innovation*, *Sloan Management Review* (1980), pp. 59-76.
 19. Paul E. Bierly, Timo Hamalainen. *Organizational Learning and Strategy*, *Scand.J.Mgmt*, Vol.11, No.3, pp. 209-224, 1995. Copyright © 1995 Elsevier Science Ltd.
 20. Von Hippel, E., "'Sticky Information' and the Locus of Problem Solving: Implications for Innovation," *Management Science* 40: 4 (1994) , pp. 429-439.
 21. Szulanski, G., "Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm," *Strategic Management Journal* 17 (1996), pp. 27-43.
 22. Nonaka, I. "A Dynamic Theory of Organizational Knowledge Creation," *Organization Science* 5:1 (1994), pp. 14-37.
 23. *Facilitating Knowledge Flow Through the Enterprise* Jeanette Bruno, GE Corporate Research & Development. CIKMVf, November 5-10, 2001, Atlanta, Georgia, USA.
 24. Tiwana, Amrit, *The Knowledge Management Toolkit: Practical Techniques for Building a Knowledge Management System*, Prentice-Hall PTR, 2000.
 25. Tushman, M.L. and Scanlan, T., *Boundary spanning individuals: their role in information transfer and their antecedents*, *Academy of Management Journal* (1981), pp. 289-305.
 26. Jingwen Li. *Economics knowledge and decision science*. Beijing Social Science Literature Publishing Company. 2002. p230-231. (in Chinese)
 27. Porter, M. E., *Competitive Advantage of Nations* (New York: Free Press, 1990).