Knowledge Management through Communities of Practice

Daniel M. Eveleth

Professor of Management and Human Resources, University of Idaho

875 Perimeter Drive, Moscow, Idaho, 83844-3161, USA

E-mail: eveleth@uidaho.edu

Abstract: A well accepted view of competitive advantage is that physical, human, and organizational resources provide a firm with the basis for a sustainable competitive advantage if the resources are rare, durable, imperfectly imitable and non-tradable. While one role of knowledge management processes and systems is to create, store and share explicit knowledge, it may be the ability to use such processes and systems to successfully manage tacit knowledge that provides the greatest opportunity to develop a source of sustainable competitive advantage. However, the very characteristics that make tacit knowledge a potentially sustainable source of competitive advantage are characteristics that also make it hard to manage and use. One way to manage tacit knowledge is to develop and support social networks, in the form of such things as communities of practice as a knowledge management tool.

1. Introduction

A well accepted view of competitive advantage with in an industry is that physical, human, and organizational resources provide a firm with the basis for a sustainable competitive advantage if the resources are rare, durable, imperfectly imitable and non-tradable [1]. Given these criteria, one potentially valuable resource is an organization's ability to create and use knowledge [2, 3 and 4]. While one role of knowledge management (KM) processes and systems is to create, store and share explicit (codified) knowledge, it may be the ability to use such processes and systems to successfully manage tacit (un-codified) knowledge that provides the greatest opportunity to develop a source of sustainable competitive advantage [5]. Factors that make a resource difficult to imitate and non-tradable include such things as casual ambiguity [6], social complexity [1], and tacitness [7]; all characteristics of un-codified, tacit knowledge in an organization.

However, it is interesting to notice that the very characteristics that make tacit knowledge a potentially sustainable source of competitive advantage (e.g., difficult to imitate, non-tradable) are characteristics that also make it hard to manage and use. Polanyi [8] has been widely cited for his position that all knowledge is either "tacit" or is embedded in tacit knowledge, because all knowledge has some "unarticulated elements" [9, p. 937]; and Wasko and Farjo [10] point out that much of the knowledge in organizations is embedded in individuals rather than systems or documentation. If some aspect of an organization's knowledge resources is hard to codify or articulate, then the resources' mobility is restricted, not just from the firm's competition (i.e., which provides the potential source of a sustained competitive advantage), but also within the organization

and among organization members. What this suggests is that efforts to capture and centralize knowledge [11] may be less effective than leaving the knowledge where it is created (i.e., in the behaviors and minds of the employees) and then developing a distributed network of employees with a configuration of linkages between employees and a strong norm of cooperation. Employees serve as nodes in the distributed network; tacit knowledge is housed in the minds and behaviors of the nodes, and one role of the knowledge management system and the role of managers is to create and strengthen the connection weights between the nodes. In short, one way to gain a sustainable competitive advantage from tacit knowledge is to develop and support social networks, in the form of such things as communities of practice [12] as a knowledge management tool [13].

Such efforts are strongly supported by the literature on cognitive psychology at the individual level that emphasizes a connectionist view of information processing over the traditional symbolic view that is consistent with how we often think of knowledge management in organizations. A connectionist view of knowledge management at the organization-level of analysis can provide a useful framework for how to manage tacit knowledge, thereby developing and sustaining a source of competitive advantage.

2. Literature Review

2.1 Symbolic versus Connectionist Views of Information Processing

In literature on cognitive psychology two models are commonly used to represent human information processing, a symbolic model and a connectionist model. While the symbolic model operates using a computer metaphor (e.g., sequential processing, a hard drive for long term storage), the connectionist perspective uses the physical characteristics of the brain as its metaphor (e.g., neurons in the brain operating in parallel to produce high speed results). Unlike the symbolic view that represents information processing as a set of separate functions coordinated by a central processing unit, the connectionist view explains knowledge management as a distributed process, using knowledge that is implicit in memory (i.e., tacit knowledge). Information is not seen as data held in a specific location, but rather a set of neurons activated in a certain pattern [14]. Via a process known as spreading activation these sets are activated by a stimulus or set of stimuli [15]. The basic difference between the approaches is that the symbolic and connectionist perspectives make different assumptions about how memory systems are organized and operate. They also have different views of how a memory system is controlled (e.g., a central vs. distributed control mechanisms) and how the sequence of cognitive operations proceeds (sequential vs. parallel). It is these differences in individual information-processing that provide some clues about how organizations might better manage knowledge.

The traditional view of information processing is on conscious processing of explicit information stored in long-term memory. The basic model includes a cognitive architecture that is characterized by short-term visual and auditory sensory stores for inputting information from the environment, a short-term or working memory with limited capacity, and a long-term memory with unlimited capacity. Processing follows a sequential format. Information from memory or sensory stores are operated on, transformed, and returned to memory. It is this perspective that permeates much of our thinking about how to manage knowledge in organization (i.e., capture knowledge and store it in memory for retrieval at a later date). Lord and Maher [14] and Kehoe [16] suggest that while symbolic models of cognition are useful for representing and discussing many of the empirical findings about individual information processing, they may be misleading when the emphasis becomes one of understanding how to manage tacit knowledge in individuals. The same can be said of understanding information processing in organizations.

The connectionist view models information processing provides an alternative view and is

useful for highlighting the processes associated with developing, storing and retrieving tacit knowledge. The focus of this perspective is on a more neurological or network level of cognition. While the symbolic view operates with a computer metaphor, this perspective uses the physical characteristics of the brain as its template (e.g., a single string of neurons in the brain operating in a sequential fashion cannot operate very fast, but in parallel they produce high speed results more typical of some human information processing). Thus, while the symbolic view suggests that cognition can be explained at a functional level, with processing proceeding in a serial fashion, using the contents of memory stores and external stimuli as the base, the connectionist view explains cognition at a neural level, with processing proceeding in a parallel fashion (i.e., parallel distributed processing), using knowledge that is implicit in memory.

Processing is not thought to occur in various functional locations coordinated by a central processing unit, and knowledge in memory may not be present except in the state of activation. That is, an internal or external prime is necessary to "retrieve" information from memory. Information in memory is not seen as data held in a specific location, but rather a set of neurons activated in a certain pattern [14] just as we might think about tacit knowledge in organizations relative to codified information. An initial stimulus primes a given pattern of neural activity [15]. Subsequent internal and/or external cues spread the pattern of activation, priming areas that were previously inactive and inhibiting other areas that were initially activated by the first stimulus. Ultimately, the pattern of neural activity 'settles-in' to a stable pattern of activation, a point at which we would say that the desired information was retrieved from memory.

This connectionist perspective of individual information processing holds promise for understanding and representing knowledge management at the organization and group levels. Specifically, the idea of a neural network helps us visualize knowledge in an organization as distributed (rather than centralized) and helps us conceptualize how technology can be used to manage knowledge by increasing connections between nodes in the network and facilitating the spreading activation process at an organization level. For knowledge networks to capture, share and reclaim strategic knowledge in an effective manner [17] managers must be sensitized to the value of looking at knowledge management as one of creating and managing knowledge as a distributive network through such constructs as a community of practice.

2.2 Communities of Practice:
Managing Knowledge as a Distributive Network

Much of the emphasis on technology-based efforts to manage knowledge relies on the ability for an organization to capture and store information in a centralized location (e.g., database). Alternatively, the connectionist view of knowledge management would suggest that, because knowledge is often implicit in memory and only available when primed, organizations should assume that much of the knowledge in an organization should be left at the location where it is created (i.e., in the minds of the employees) and that organizational-efforts should be directed at increasing the number of connections between nodes (i.e., employees) in the network and at increasing the strength of the connections (e.g., creating a culture that values information seeking and sharing). The primary role of technology would not be as a repository of explicit knowledge, but as a mechanism for connecting nodes in the network (e.g., a community of practice) that contain tacit knowledge.

A community of practice is a voluntary group of people where knowledge is created and stored in a decentralized manner, shared among the community members, and applied to practice [18]. Tacit knowledge emerges from the sharing of the knowledge from the continuous practice in the

community. Proximity or a shared location helps sustain the community, but it is the involvement and engagement of the members that is critical to the effectiveness of the community. Connections with community members produce a collective practice. Trying, adopting, accepting, and rejecting practices creates associations of shared accountability critical to practice. Such behaviors as sharing so-called war stories and having informal discussions form a collection of agreed upon information and techniques to be utilized by members of the group [19].

Wenger [18, 20] states that communities of practice exhibit four characteristics: 1) learning as a process of becoming a part of something (identification), 2) learning as a set of shared experiences that create a common understanding (meaning), 3) learning as a process of engagement or learning by doing (involvement), and 4) learning as a process of attachment to the community (belongingness). Consistent with principles of social learning theories, managers and organizational practices play critical roles in the extent to which members of a community of practice identify with the community, develop a sense of meaning, exhibit a high degree of involvement in the community, and develop a strong feeling of belonging to the community.

Guechtouli, Rouchier and Orillard [21] point out that communities of practice can play a critical role in helping diffuse knowledge, particularly from experts to newcomers in an organization, through direct and indirect means. It is the direct means (i.e., without an intermediary such as a procedure manual or database) that most represents the value of the connectionist perspective – i.e., one that places a heavy emphasis on maintaining a distributed network and focusing on developing and strengthening connections between nodes in the network.

Ramchand and Pan [22] found that a critical role of management is to "facilitate rather than control" (p. 21) the development of the communities. While we can imagine that creating connections between employees or nodes in the network can be done with technology, forced proximity (e.g., office or desk locations) , and formal interaction (e.g., mentoring programs, training sessions), the fact that management must "facilitate rather than control" the development of communities of practice suggests that the greater challenge for management lies in strengthening the connection weights between nodes (i.e., increasing the willingness to seek and share information). Zboralski [23] suggests that the development of relationships (i.e., and thus, strong connections between nodes) depends, in part, upon the organization's ability to increase trust and cohesion among members of a community and to develop a "communication climate" (p. 91). Others [10 and 24] suggest that levels of interaction or engagement (e.g., making or responding to queries) depend upon the degree of reciprocity that takes place in the community. Rather than because of altruism or citizenship behavior, an individual is more likely to participate in the future if his or her queries lead to favorable responses from other members or if participating in the community leads to benefits, such as prestige. Facilitating the exchange of benefits or rewards between members strengthens the connections, thereby increasing the potential for spreading activation (i.e., seeking and responding to queries) to take place in the future.

In addition, Ramchand and Pan [22] concluded that that the focus of knowledge management efforts is best directed at developing multiple communities of similar expertise or functions, rather than to develop cross-functional groups or even a single large community. Because much of the motivation to participate lies in receiving benefits from the exchange, such as increased learning, improved career opportunities, more professional connections [23] and "getting work done more quickly" [25, p. 34], employees are much more likely to participate in communities that share similar 'practice'. While it is possible to develop a company-wide climate of communication and information sharing, much of the motivation to share will lie in sharing within functional, rather than cross-functional communities. This places an additional responsibility on management to identify and facilitate the role of boundary spanning activities [26, 27 and 28] that can build connections between communities, or to redefine the definition of 'practice' [29] around more cross-disciplinary activities (e.g., innovation, problem-solving).

Another interesting challenge facing managers extends from a finding by Schenkel and Teigland [30] that communities of practice that had stable communication channels performed better than a community of practice that experienced changes in its communication channels. In individual information-processing the speed at which information is accessed and processed is a function of the number and strength of the neural pathways or connections within the network. Assuming that the analogy holds for organization-level networks and information processing, it makes sense that changes that either inhibit or break connections within the network have the potential to decrease performance of the network. Thus, while organizations such as Google or Yahoo take pride in continuous acquisitions and reorganizations as sources for innovation, there may be a cost of decreased learning and sharing that results from changing the members of a community or changing the ability for the members to easily interact in informal settings where storytelling and other forms of face-to-face sense making can take place.

3. Conclusion

One of the many interesting features of the human brain is the fact that information (e.g., names, dates, stories, facts) is implicit and does not exist except in a state of neural activation. While we like to think about information processing as a search, retrieve and replace activity that focuses on storing explicit knowledge in memory locations, a more useful analogy is one of a neural network where information is distributed, and information processing occurs through an internally- and/or externally-primed spreading-activation process. This understanding about how information is processed in the human brain provides both the opportunity and the challenge for better understanding how to manage tacit knowledge in organizations.

While organizations often place much of their efforts on acquiring, isolating and maintaining tangible resources that could serve as sources of competitive advantage, it is information, and the tacit nature of much information that has a unique potential to serve as sources of sustainable competitive advantage. To do so requires managers to better understand how to manage knowledge as it exists in a distributive network, rather than only focusing on capturing and storing explicit or codified knowledge that is more easily imitated or tradable. The connectionist view of information processing and the communities of practice construct provide complementary advice about how to do so. Together, they suggest that the task of the organization is to manage knowledge by developing and facilitating a set of communities of practice within the organization, each serving as separate neural networks focused around practice. Information is distributed throughout the community and activated through interaction among the members. Within the communities managers must focus on creating and strengthening the connections between members or nodes in the network through such things as stable, information-rich communication channels, developing trust and cohesiveness and creating a climate that values seeking and sharing information.

In addition, the connectionist analogy can be extended one level higher, conceptualizing each of the communities of practice within the organization as nodes in a larger network. In this case, the role of the organization extends to building and strengthening connections between the community-of-practice nodes. The 'collective bridge' concept [31] provides a useful way to frame a discussion about how to build a network of networks (i.e., an interconnected a set of communities of practice). Developing a collective bridge between communities is different from identifying and utilizing boundary spanners that move between the communities of practice. It is a more connectionist-like structure that is a "broad nexus of relationships among members" [31] of the various communities that house and develop the tacit knowledge that can serve as a source of competitive advantage for the firm.

References

[1]. Barney, J. (1991), "Firm resources and sustained competitive advantages", *Journal of Management*, 17(1): 99-120.

[2]. Argote, L. and Ingram, P. (2000), "Knowledge transfer: A basis for competitive advantage in firms", *Organizational Behavior and Human Decision Processes*, 82(1): 150–169.

[3]. Nahapiet, J., and Ghoshal, S. (1998), "Social capital, intellectual capital, and the organizational advantage", *Academy of Management Review*, 23(2): 242-266.

[4]. Muthusamy, S. K. and R. Palanisamy (2004) "Leveraging cognition for competitive advantage: A knowledge-based strategy process", *Journal of Information and Knowledge Management*, 3(1): 259-272.

[5]. Harlow, H.D. (2008), "The effect of tacit knowledge on firm performance", *Journal of Knowledge Management*, 12 (1): 148 – 163.

[6]. Lippman, S. A. and Rumelt, R. (1982), "Uncertain imitability: An analysis of inter-firm differences in efficiency under competition", *Bell Journal of Economics*, 13: 418-438.

[7]. Reed, R. and Difillippi, R. J. (1990), "Causal ambiguity, barriers to imitation and sustainable competitive advantage", *Academy of Management Review*, 15: 88-102.

[8]. Polanyi, M. (1967), *The tacit dimension*. Garden City, New York: 217.

[9]. Miller, Kent D. (2008), "Simon and Polanyi on rationality and knowledge", *Organization Studies*, 29(7): 933 -955.

[10]. Wasko, M. and Faraj, S. (2000), "It is what one does: Why people participate and help others in electronic communities of practice", *Journal of Strategic Information Systems*, 9(2-3): 155-173.

[11]. Kingston, K. C. (2012), "Tacit knowledge, capture, sharing and unwritten assumptions", *Journal of Knowledge Management Practice*, 13(3).

[12]. Wenger, E., McDermott, R., and Snyder, W. M. (2002), *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Harvard Business School Press.

[13]. Eveleth, D. M. (2012), "Knowledge management in changing environments: Lessons from expert and non-expert decision-making literature", *International Journal of Knowledge Management Studies*, 4(4): 375-388.

[14]. Lord, R. G., and Maher, K. J. (1990), "Alternative information processing models and their implications for theory, research, and practice", *Academy of Management Review*, 15: 9-28.

[15]. Anderson, J. R. (1990), *Cognitive psychology and its implications*. New York: Freeman.

[16]. Kehoe, E. J. 1988. "A layered network model of associative learning: Learning to learn and configuration", *Psychological Review*, 95: 411-433.

[17]. Nielsen, B. B., and Ciabuschi, F. (2003), "Siemens ShareNet: Knowledge management in practice", *Business Strategy Review*, 14(2): 33-40.

[18]. Wenger, E. (1998), *Communities of practice: Learning, meaning, and identity*. New York: Cambridge University Press.

[19]. Baker-Eveleth, L., Supra Sarker, J., and Eveleth, D. M. (2005), "Formation of an online community of practice: An inductive study unearthing key elements", *Proceedings of the Hawaii International Conference on System Sciences*, January 5-8, 2005, Big Island, Hawaii.

[20].   Wenger, E. (2000), "Communities of practice and social learning systems", *Organization*, 7(2): 225-246.

[21].   Guechtouli, W., Rouchier, J. and Orillard, M. (2013), "Structuring knowledge transfer from experts to newcomers", *Journal of Knowledge Management*, 17(1): 47-68.

[22].   Ramchand, A., and Pan, S. L. (2012), "The co-evolution of communities of practice and knowledge management in organizations", *ACM SIGMIS Database*, 43(1): 8-23.

[23].   Zboralski, K. (2009), "Antecedents of knowledge sharing in communities of practice", *Journal of Knowledge Management*, 13: 90-101.

[24].   Ellis, D., Oldridge, R. and Vasconcedes, A. (2004), "Community and virtual community", *Annual Review of Information Science and Technology*, 38(1): 145–186.

[25].   Lesser, E. L. and Storck, J. (2001), "Communities of practice and organizational performance", *IBM Systems Journal*, 40(4): 831-841.

[26].   Akkerman, S. F. and Bakker, A. (2011), "Boundary crossing and boundary objects", *Review of Educational Research*, 81(2): 132-169.

[27].   Borzillom S. and Kaminska-Labbé, R. (2011), "Unravelling the dynamics of knowledge creation in communities of practice though complexity theory lenses", *Knowledge Management Research and Practice*, 9: 353-366.

[28].   Levina, N. and Vaas, E. (2006), "Turning a community into a market: A practice perspective on information technology use in boundary spanning", *Journal of Management Information Systems*, 22(4): 13-37.

[29].   Swan, J., Scarbrough, H. and Robertson, M. (2002), "The construction of communities of practice in the management of innovation", *Management Learning*, 33: 477-496.

[30].   Schenkel, A. and Teigland, R. (2008), "Improved organizational performance through communities of practice", *Journal of Knowledge Management*, 12(1): 106-118.

[31].   Zhao, Z. J. and Anand, J. (2013), "Beyond boundary spanners: The 'collective bridge' as an efficient interunit structure for transferring collective knowledge", *Strategic Management Journal*, 34: 1513-1530.