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Holistic Views of Knowledge Management Models

Baiyin Yang
Wei Zheng
Chris Viere

The problem and the solution. Based on a newly developed holistic theory of knowledge and learning, this article critically evaluates selected models of knowledge management (KM) and proposes a holistic KM model. Most existing KM models tend to narrowly define knowledge from conceptual and perceptual perspectives and fail to recognize affectual knowledge such as values and visions. Furthermore, most models view KM as a linear or cyclical process and thus fail to identify the multidimensional nature of the knowledge dynamics between individuals and organizations. Implications of the holistic model for human resource development are discussed.

Keywords: *holistic theory; knowledge management; organizational learning*

Knowledge management (KM) and related terms such as organizational learning and learning organization have become buzzwords in business practices and popular research topics in the field of human resource development (HRD). The central concept among these terms is knowledge. Compared with the wide usage of the term *knowledge*, a clear definition of an organized framework revealing and integrating the underlying structure of knowledge theories has received inadequate attention in the literature. Tsoukas and Vladimirou (2001) contend that “Organizational knowledge is much talked about but little understood” (p. 973).

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There is an increasing body of literature on KM, and yet limited comparative theoretical integration exists. One notable effort by Argote, McEvily, and Reagans (2003) suggests an integrative framework for organizing the literature on KM. This framework consists of two dimensions, KM contexts and outcomes. Knowledge creation, retention, and transfer represent KM outcomes. The KM contexts are reflected in units (individuals, groups, or organizations) and the relationships between units and the nature of knowledge itself (tacit vs. explicit). It has been observed that existing theoretical frameworks of KM can be categorized into one of three contexts. Some frameworks emphasize the properties of the units themselves (Cohen & Levinthal, 1990), some recognize the importance of the relationships between units (Crossan, Lane, & White, 1999), and yet others call attention to the nature of knowledge such as tacitness (Nonaka & Takeuchi, 1995). Overall, although several comprehensive frameworks for organizing KM theories have appeared in the literature, two shortcomings exist relevant to the purpose of the article at hand. First, many existing frameworks have not yet been fully developed because the interactions between key components of knowledge are not identified nor described, which leads to incomplete views of KM. Second, no effort was made to critically examine the prevalent KM theories in the literature.

KM theory and practice deserves attention in HRD literature because KM is fundamentally aligned with HRD. According to McLean and McLean (2001),

HRD is any process or activity that, either initially or over the long-term, has the potential to develop adult's work-based knowledge, expertise, productivity, and satisfaction, whether for personal or group/team gain, or for the benefit of an organization, community, nation, or ultimately the whole of humanity. (p. 322)

Because of the shared focus on the development of work-based knowledge, KM deeply aligns with this definition and purpose of HRD and shares applicability beyond the organizational level to the national and global levels. As a field of study and practice, HRD professionals need to have a clear concept of knowledge and develop powerful KM principles so as to improve practice.

The purpose of this article is to comparatively examine the major models of KM in the literature from an integrative and holistic perspective. This article has two related objectives. First is to demonstrate the utility of a newly developed holistic theory that takes an integrative perspective of knowledge and therefore could inform models of KM. Second, the article aims to critically examine major models of KM and illuminate differences that have a practical impact for KM and HRD.

Theoretical Foundation

To manage knowledge, our understanding of what knowledge consists of is essential. In this section, we introduce an emergent model of KM based on Yang's (2003) model of holistic learning.

Three Knowledge Facets

Yang (2003) proposed a holistic learning theory that defines knowledge as a construct with three distinct and interrelated facets—implicit, explicit, and emancipatory knowledge. This article builds on this perspective and uses three different terms for purposes of clarity—perceptual, conceptual, and affectual knowledge. *Perceptual knowledge* refers to personal kinesthetic understanding of the world through direct experience and involvement in a particular situation. *Conceptual knowledge* indicates abstract concepts and a scheme of interrelated concepts that may be transferred across situations. *Affectual knowledge* is individuals' sentiment attached to certain objects. Knowledge is viewed as human beings' awareness and understanding about reality gained through personal familiarity, cognitive and mental processing, and emotional affection. The facets of knowledge are different aspects of the way through which we get to know the physical, social, emotional, and spiritual world.

A Dialectic Perspective of the Three Knowledge Facets

Although classifying human learning into three domains (i.e., cognitive, psychomotor, and affective) is not new (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956), the holistic theory views that all of these three facets or dimensions are interrelated. Yang (2003) posits that all of the three facets are present in all learning processes, even though not all of them need to undergo a change for learning to happen. Furthermore, the holistic theory calls for a dialectical perspective of the three knowledge facets. On one hand, there are some intrinsically different characteristics of the three knowledge facets; they seem to be different and contradictory, like the two faces of a coin. On the other hand, they interact with each other and become indivisible when we take a holistic perspective. They occur by default whether we recognize them or not. All of the three facets are necessary components of the whole.

The holistic learning theory asserts that the construct of knowledge consists not only of the three facets but also of three knowledge layers (Yang, 2003). The knowledge layers include foundation, manifestation, and orientation. The first layer is a stratum of foundation or premise, which serves as the basis for our knowing and determines the boundary. Foundation includes those tacit assumptions that have been taken for granted as valid and are not normally requiring proof. We have to accept certain assumptions to know and act. This layer indicates our epistemological beliefs. The second layer is manifestation that represents the outcomes of our knowing. The third layer is the orientation of our knowing, which defines the direction and tendency of knowing action. The third layer indicates the driving forces of our learning process.

Organizational Knowledge

The holistic theory further suggests that learning is not only an individual activity but also a social phenomenon (Yang, 2003). An individual learner has

Table 1: Holistic Theory of Organizational Knowledge

Knowledge Layers	Knowledge Facets		
	Technical	Practical	Critical
Foundation	Institutionalized Conceptual Knowledge (System and Structure)	Collective Perceptual Knowledge (Process and Practice)	Dominated Affectual Knowledge (Value and Vision)
Manifestation	Rules, regulations, policies, standard operation procedures, technical specifications, formal communication channels and formats	Shared experiences, social norms, customs, conventions, shared understandings, intuitions, insights, routines, technical know-how	Mission awareness, managerial philosophies, sense of social responsibilities, morale, ethical and moral standards, and spirituality
Orientation	Rationality (reflected as efficiency and optimization)	Reality (reflected as effectiveness and flexibility)	Liberty (reflected as productivity and responsibility)

to interact with his or her immediate social group or organization within certain social and cultural contexts. The holistic theory posits that group or organizational knowledge has three corresponding facets—technical, practical, and critical knowledge. Similar to individual knowledge, group and organizational knowledge can be viewed as a social construct with three facets, and each of them has three layers. Table 1 lists the three layers of group and organizational knowledge in three domains. The first facet of group and organizational knowledge is technical knowledge, which is demonstrated in a formal system and structure. Technical knowledge is institutionalized conceptual knowledge of individual members (Crossan et al., 1999). Technical knowledge is manifested by those establishments such as formal rules, regulations, policies, standard operation procedures, technical specifications, and formal communication channels and formats. The orientation of technical knowledge is efficiency and optimization, which is one of the major driving forces of organizations. In other words, the main function of technical knowledge of an organization is to produce maximum products and services with efficient use of available resources for a clearly defined mission. Once technical knowledge is acquired and established in a group or in an organization, it influences an individual employee's behavior mainly through the rational driving force within the domain of conceptual knowledge.

The second facet of group and organizational knowledge is practical knowledge, which can be identified in organizational processes and practices. It is

manifested as perceptual or implicit knowledge that has not been (or cannot be) incorporated into formal organizational systems. Examples of practical knowledge include shared experiences, social norms, customs, conventions, shared understandings, intuitions, insights, routines, and technical know-how. Practical knowledge also includes individual employees' knowledge that has not been incorporated into the formal system, such as their awareness of market changes. Organizational learning of practical knowledge can be facilitated by action-oriented activities such as socialization, conversation and dialogue, and some interactive systems (Crossan et al., 1999). Practical knowledge is oriented toward effectiveness and flexibility, one of the driving forces for a group or organization to function. A group or organization's practical knowledge is a collection of its members' knowledge that has been proven to be workable in practice.

The third facet of group and organizational knowledge is critical knowledge, which is based on the foundation of organizational value and vision. Critical knowledge can be defined as the dominant affectual knowledge of its members. Because individuals tend to possess diverse values and visions of their own and have different understandings about organizational issues, the formation and change of critical knowledge generally involve organizational power and politics. It also activates and defines individual and organizational interests and ethics. Critical knowledge is manifested by those less stable but vital elements such as mission awareness, managerial philosophies, organizational politics and power distribution, economic gain, and ethical and moral standards in the workplace. Critical knowledge is largely determined by the sense of social responsibility and it interacts directly with individual employees' affectual knowledge.

A Holistic KM Model

On the basis of the above review, we propose that KM can be viewed as a process of managing change in the dimensions of technical, practical, and critical knowledge in an organization, as well as managing the dynamic interactions of the three dimensions of knowledge. In other words, KM encompasses the creation, transferring, and use of the three dimensions of knowledge and the facilitation of the transformation of one facet of knowledge to another. We think that organizations need to manage in both epistemological and ontological dimensions. Figure 1 depicts a new model of KM that describes the dynamic interactions among the three knowledge facets at both the individual and organizational levels.

There are nine KM processes in the realm of epistemological dimensions: socialization, systematization, transformation, formalization, routinization, evaluation, orientation, deliberation, and realization. Socialization encompasses the processes of organizational members' creation of new practical knowledge from their actual experience in order to become fully participating and effective

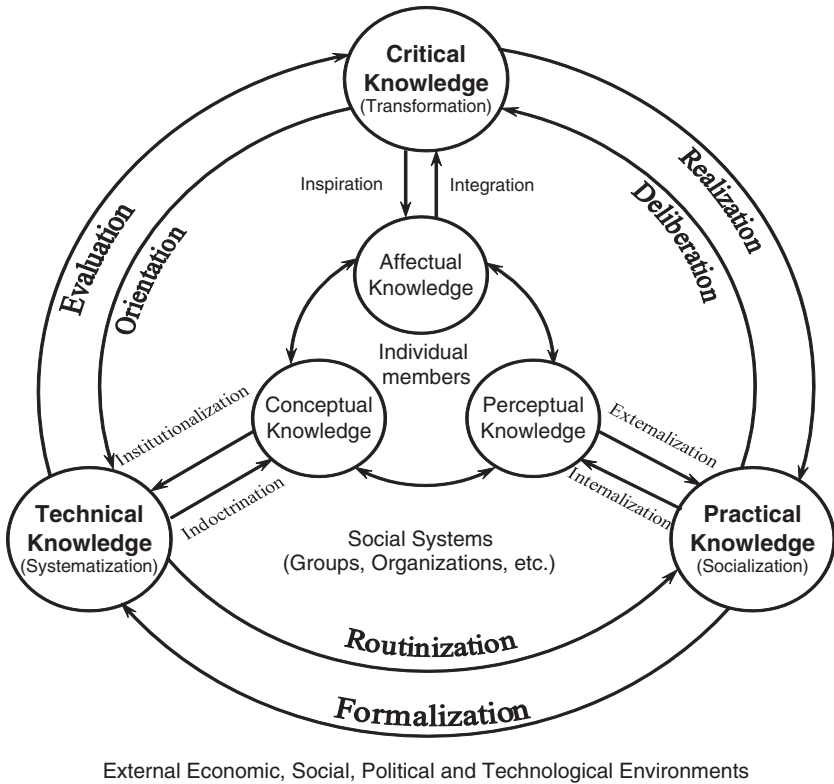


FIGURE 1: A Holistic Framework of Knowledge Management

members in a community of practice. Systematization is a process of systematizing technical knowledge gained from organizational members into a system with explicit rules and systems. Transformation is a process of changing an organization’s fundamental values and visions by leading it toward internal productivity and social responsibility. Formalization is a process of articulating, transferring, and formalizing practical knowledge into a structured organizational system. As results of this KM process, employees’ roles are structured and their activities are governed by formal rules and procedures. It converts intangible knowledge into tangible explanations by embedding practical knowledge gained from practice into new rules, systems, or structures. Conversely, routinization is a process of implementing technical knowledge into practical knowledge. It is the process of using rules and systems in a specific work context so that such explicit rules and requirements become regular and conventional procedures. Evaluation is a process of determining the values and guiding principles of organizational members on the basis of reasoning,

shared rules, and structures (changing from technical knowledge to critical knowledge). Conversely, orientation is a process of justifying organizational rules and regulations based on the values and guiding principles held by members. Deliberation is the process of making collective meanings and beliefs from organizational members' actual experience. Conversely, realization is a process of realizing organizational values by putting them to the test of practical knowledge.

There are six KM processes in the realm of ontological dimensions: *institutionalization*, *indoctrination*, *externalization*, *internalization*, *inspiration*, and *integration*. Institutionalization is a process of translating effective conceptual knowledge from individual members as part of normal and structured organizational system. It aims at establishing action guidelines applicable to daily activities. Indoctrination is a process of transmitting formal requirements and regulations to all organizational members. Externalization is a process of converting individual members' implicit knowledge into shared practical knowledge in a community of practice. Internalization is a process of making practical knowledge such as routines and mental models digestible to organizational members. Inspiration is a process of uniting organizational members through shaping and aligning with members' values, visions, and aspirations. Integration is a process of developing shared attitudes, values, visions, and aspirations among organizational members through mutual adjustment.

A Comparative Review of Selected KM Models

Knowledge Creation Model

Nonaka and Takeuchi (1995) propose a knowledge creation model. This model describes the creation and dissemination of knowledge throughout an organization as embodied within its "products, services and systems" (Nonaka & Takeuchi, 1995, p. 3). According to the theory, knowledge moves on two ontological dimensions (individuals to organizational) and on two epistemological dimensions (tacit and explicit). Tacit knowledge is characterized as more difficult to formalize and communicate because it is often intimately tied to action and experience. Explicit knowledge is the knowledge that can be put into words, written down, modeled, and relatively easily transferred. The modes of knowledge conversion include socialization (from tacit to tacit knowledge), externalization (from tacit to explicit knowledge), combination (from explicit to explicit knowledge), and internalization (from explicit to tacit knowledge). The progression on the ontological dimension ranges from the individual at one end and moves to team, group, organization, and beyond in a spiral-like fashion "when the interaction between tacit and explicit knowledge is elevated dynamically from a lower ontological level to higher levels" (Nonaka & Takeuchi, 1995, p. 57). The knowledge-creation process for this model contains five steps—sharing tacit knowledge, creating concepts, justifying concepts, building an archetype, and cross-leveling knowledge (Nonaka & Takeuchi,

1995; von Krogh, Ishijo, & Nonaka, 2000). Enabling of knowledge creation organizationally is promoted by examining barriers, establishing conditions by creating an enabling context, and by establishing organizational enablers (von Krogh et al., 2000). On the basis of their model, Nonaka and Takeuchi (1995) suggest that organizations need to mobilize tacit knowledge and facilitate the socialization, combination, externalization, and internalization process through which knowledge can be created.

The knowledge creation model recognizes the potential nature of tacitness of the knowledge and provides useful concepts of the dynamic interactions between explicit and tacit knowledge. However, there are several limitations associated with this model. First, despite its illustration of the knowledge creation process between individuals and organizations, this model does not differentiate individual and organizational knowledge. Therefore, it fails to acknowledge the characteristics of knowledge at different organizational levels. In practical terms, how to manage individual knowledge and how to manage organizational knowledge may be different and yet this model does not point to differential treatment when it comes to different levels of knowledge. Second, this model suggests that knowledge creation is a spiral process and implies that all types of knowledge have to go through a tacit–explicit process. In fact, much tacit knowledge cannot be externalized and the learners have to participate in a community of practice to gain such knowledge. Therefore, the limitation of externalization should be recognized. For example, most professional schools require their students to fulfill practicum (i.e., to gain tacit knowledge) in addition to formal schooling (i.e., to acquire conceptual or explicit knowledge). Third, this model fails to recognize a third facet of knowledge, affectual or emancipatory knowledge. Learning and knowledge creation should not be isolated from emotion, motivation, and perceived needs. Managing knowledge does not occur in a value-free context. Knowledge managers should always be aware of the values, beliefs, and guiding principles of organizational members that influence their willingness and decision to exert efforts in KM activities.

The 4I Framework of Organizational Learning

Crossan et al. (1999) observe that despite a growing popularity, there has been little convergence among organizational learning theories. This model, also referred to as the 4I framework, contains four process stages of organizational learning that consist of *intuiting*, *interpreting*, *integrating*, and *institutionalizing*. Each of the 4I process stages are conceptualized at the individual, group, and organizational levels. Together, the stages and levels and their interactions are explicated to improve organizational learning for the underlying purpose of strategic renewal in organizations.

In Crossan et al.'s (1999) model, the central proposition states that the four *I*s (intuiting, interpreting, integrating, and institutionalizing) are related in

“feed-forward and feedback processes across the [organization] level.” (p. 523). In the framework, intuiting and interpreting occur at the individual level. Intuiting refers to subconscious recognition of the pattern and/or possibilities that are implicit to a personal experience that leads to the development of tacit knowledge. For Crossan et al., interpreting is largely a cognitive act and progressively conscious act of explaining, through words and/or actions, a cognitive map with insights or ideas to one’s self and to others as change from previous understanding and/or actions. As learning progresses from individual learning toward group learning, a process of integration begins to occur. Crossan et al. refer to the process of integrating as developing shared understanding among individuals and with the outcome of taking shared and coordinated actions through mutual adjustment. Institutionalizing refers to the process of ensuring that routinized actions occur as an organization strives to leverage the knowledge created by individuals or informal communities. This model provides a systematic and dynamic model of organizational learning that includes processes and levels, focusing on the flow of knowledge from implicit to explicit, and from the individual to the group. On the basis of their model, Crossan et al. propose that managers need to be aware of the facilitators and inhibitors of the four processes, paying particular attention to systems such as reward systems, information systems, resource allocation systems, strategic planning systems, and structure. However, no further suggestions were offered.

From the perspective of Yang’s (2003) holistic theory, the foundation or premise generally represents, in part, an epistemological belief system. The holistic theory defines knowledge as a social construct with three distinctive and interrelated facets—conceptual, perceptual, and affectual knowledge. The knowledge facets provide visibility into an epistemological basis for the holistic theory that calls for acknowledging a dynamic interplay in the creation of knowledge between empirical–analytic, interpretive, and critical epistemologies (Yang, 2003). Crossan et al.’s (1999) 4I framework does not fully explicate the foundations of the framework with respect to highlighting epistemologies or knowledge facets. The framework does begin to illustrate the roles of explicit and implicit knowledge, but stops short of acknowledging an affectual or emancipatory facet.

Both frameworks, 4I model and the holistic theory, however, advance propositions related to learning processes. Crossan et al.’s (1999) intuiting process is closely related to gaining implicit knowledge at the individual level. Interpreting in the framework represents developing cognitive maps and is similar to conceptualization in the holistic theory. However, the interpreting process centers on the cognitive domain and the role of the affective domain and emancipatory knowledge equivalent is not defined or mentioned. Integration in Crossan et al.’s framework refers to shared understanding by group members that results in coherent, collective actions. This learning process reflects the dynamic relationships between the individual and the group. However,

the holistic theory suggests that the integration of individual knowledge does not always occur in the cognitive and explicit domain but can also occur in the behavioral and implicit domains, through processes such as transferring knowledge hard to express into formal language and symbols, and emancipatory knowledge into its values and consequently change its critical knowledge. Likewise, both models incorporate the concepts embodied by Crossan et al.'s notion of the *institutionalizing* process but differ when moving beyond the conceptual, in the continued interplay of perceptual and affectual knowledge.

The major weakness of the 4I model is its failure to recognize the nature of knowledge. Because the 4I framework does not distinguish the three facets of knowledge and clarify its epistemological knowledge basis, it fails to capture some of the key organizational learning activities. For example, the holistic theory suggests that changing an organization's values and visions is a vital learning process and that it is critical knowledge that interacts with individuals' shared values and critical knowledge. Rules and procedures can be institutionalized but cannot guarantee the desired change and the coherence of individual values.

Information-Space Model

Boisot (1998) proposes that individual knowledge is the sum of our mental models and through these mental models we process data and information to bring about actions and change. Boisot contends that knowledge is essentially a set of patterns stored in the memory that helps us make sense of the world. He further categorizes knowledge along three dimensions of codification, abstraction, and diffusion. These three dimensions make up the information-space (I-Space) for capturing the distribution of knowledge in organizations. In terms of codification, knowledge is either codified or uncoded. Codified knowledge refers to the knowledge that is represented by language or other systems. Codified knowledge is easily transmittable from one human agent to another. On the contrary, uncoded knowledge is highly dependent on the implicit expertise of the human agent. The second dimension, abstraction, describes the extent to which knowledge is abstracted from the concrete and observable information. Knowledge with higher abstraction is believed to be constructed through building relationships of less abstract knowledge (Boisot, 1998). The third dimension is diffusion. This refers to the extent to which knowledge is available among human agents. Boisot suggests that organizations need to decide on their codification and abstraction strategies on the basis of their respective circumstances.

Boisot's (1998) three-dimensional I-Space model bears similarities with the holistic model. The codification dimension is similar to Yang's (2003) distinction between conceptual and perceptual knowledge, because conceptual knowledge can be easily codified by language or other systems and thus can

be transmitted from one agent to another. On the other hand, perceptual or implicit knowledge is usually not verbalized or codified through other means. As regards the diffusion dimension, the holistic model elucidates three levels along this dimension: individual, group, and organization.

The holistic model proposes three dimensions of knowledge: conceptual, perceptual, and affectual. Boisot's (1998) model considers the explicit (codified) and implicit (uncodified) dimensions but does not consider the affectual dimension. Elements of the affect factor is recognized in his model as the perceptual and conceptual filters that influence what data and information human agents turn into knowledge. However, Boisot fails to accommodate these filters into his model of knowledge. The holistic model takes into consideration these filters and offers a third category of knowledge—*affectual or emancipatory knowledge*. This affectual knowledge is defined as the objectives and missions that guide our actions. In Boisot's model, the perceptual and conceptual filters are such knowledge that dictates what knowledge human agents take in and spread as well as what direction human actions take. The holistic model absorbs this affectual knowledge into the nature of knowledge, contrary to Boisot's model that externalizes these filters. The reason for internalizing the filters into the arena of knowledge is consistent with Boisot's definition of knowledge—a set of patterns stored in memory that helps us make sense of the world (Boisot, 1998). These filters as conceptualized by Boisot are previous patterns that exist in the human mind in understanding the world. When it comes to managing knowledge, leaving out the affectual dimension of knowledge may lead knowledge managers to focus too much on the technical aspects of knowledge—its level of abstraction, codification, and diffusion. The alignment or misalignment of these aspects of knowledge with the values and guiding principles of organizational members ultimately decides the effectiveness of KM.

Learning With Knowledge Cycle Model

A large portion of the past literature focuses on KM processes. Demerest (1997) builds a KM model that consists of four stages: knowledge construction, knowledge dissemination, knowledge use, and knowledge embodiment. Soliman and Spooner (2000) modify this model and proposed a five-stage KM chain. Their five stages are as follows: create knowledge, capture knowledge, organize knowledge, access knowledge, and use knowledge. Based on their models, Rowley (2001) suggests a model, the Learning with Knowledge Cycle (LK cycle), that consists of knowledge articulation, knowledge repository updating, knowledge access, knowledge use, and knowledge revision. According to Rowley, the cycle applies to both explicit and implicit knowledge, which means that these stages are equally applicable to both explicit and implicit knowledge.

These KM process models contribute to the conceptualization of the development of knowledge from the individual to the organizational level, but they offer only a macro picture of KM. Although they are useful in grouping different organizational activities into different KM processes, these models do not account for the dynamic relationships and interactions of the components of knowledge. Nor do they describe how knowledge moves from one stage to another. In practice, the interrelations among people or units often affect the learning process. The rigid segregation of the flow of actions and events into static stages is inadequate to direct practice effectively.

Rowley (2001) includes explicit and implicit knowledge in the LK model. However, she posits that both explicit and implicit knowledge go through the processes discussed in the model. This proposition puts an indiscriminate face on explicit and implicit facets. As implicit knowledge is something hard to formalize and communicate because of the familiarity that has yet to be articulated, it is difficult, if not impossible altogether, to make a convincing case that the evaluation, dissemination, use, and revision of such unarticulated knowledge can be done the same way for explicit knowledge. How can some unarticulated, un verbalized, and shapeless knowledge be measured and weighed? Different types of knowledge need to be managed differently. For example, a more social approach needs to be implemented when managing the tacit, not-yet-articulated knowledge, whereas a more codified approach should be used when managing explicit knowledge.

Another inadequacy is similar to that of Boisot's model. The affectual aspect of knowledge is not given sufficient attention. Rowley (2001) claims that the LK cycle model embraces the social construction of knowledge, but it actually follows a mechanical approach of disregarding the value orientation of individuals or interrelations of people, which is in the realm of the affect aspect of knowledge.

Holistic Comparison of KM Theories

Throughout this review of selected knowledge theories, several themes were found to be systemic across most theories reviewed. The themes include knowledge facets, knowledge conversion between knowledge facets, distinguishing organizational levels, and knowledge creation and learning processes. Not all theories contained these structures and this will be highlighted.

Knowledge Facets

The knowledge facets, when described, generally referred to the epistemological source of knowledge. As shown in Table 2, nearly all theories referenced or in a major way addressed the contribution of implicit and explicit knowledge as described in the review. Yang (2003) exclusively argued for the inclusion of critical knowledge facet as a vital holistic component of knowledge.

Table 2: A Comparison of KM Models—Epistemological Sources of Knowledge

KM Models and Proponents	Knowledge Facets and Dimensions		
	Practical (Implicit, Perceptual)	Technical (Explicit, Conceptual)	Critical (Affectual, Emancipatory)
Knowledge Creation Model (Nonaka & Takeuchi, 1995)	X	X	–
Knowledge Cycle Model (Demerest, 1997)	O	O	–
Information Space Model (Boisot, 1998)	X	X	–
4I Framework (Crossan, Lane, & White, 1999)	X	X	–
Holistic Theory (Yang, 2003)	X	X	X

Note: X = major focus; O = minor focus; – = not discussed.

Leveraging the critical (affectual) facet of learning, practitioners may be able to develop initiatives leading to productive and transformative learning environments, facilitate cultures that fully support knowledge sharing, and organizational participants that are more motivated to use new knowledge.

Knowledge Conversion Between Knowledge Facets

Knowledge conversion in KM literature is the movement of knowledge from one facet to another. As shown in Table 3, whether or how the theory discusses knowledge conversion is a reflection of the theory's focus on its dynamic nature in relation to knowledge facets and epistemological sources. For example, by arguing for the critical facet, Yang (2003) has illuminated exponentially more sources of learning in the conversion of knowledge.

Distinguishing Organizational Levels

HRD literature contains a long history of addressing organizational levels in theory and practice approaches. Several KM theories distinguished the influence of the organizational levels, shown in Table 4, in the knowledge development process. Yang (2003) addresses the organizational level in a unique way by defining the technical knowledge, practical knowledge, and critical knowledge as organizational knowledge amplified through their respective knowledge facets. Overall, how a knowledge theory manages the organizational levels appears to have significant bearing on the theory's structure.

Table 3: A Comparison of KM Models—Dynamic Conversion Between Knowledge Facets

KM Models	Knowledge Facet Conversion
Knowledge Creation Model	Four modes: socialization (from tacit to tacit knowledge), externalization (from tacit to explicit knowledge), combination (from explicit to explicit knowledge), and internalization (from explicit to tacit knowledge)
Knowledge Cycle Model	Does not address
Information Space Model	Alludes to implicit-to-explicit conversion in the codification stage of process
4I Framework	Not directly addressed, but the intuitive stage of process reflects implicit learning, whereas institutionalizing may refer to conversion to explicit from implicit
Holistic Theory of KM	Nine modes: socialization (implicit to implicit), formalization (implicit to explicit), routinization (explicit to implicit), systematization (explicit to explicit), orientation (explicit to critical), evaluation (critical to explicit) transformation (critical to critical), realization (critical to implicit), and deliberation (implicit to critical)

Table 4: A Comparison of KM Models—Ontological Dimensions of Knowledge

Theory	Ontological Dimensions		
	Individual	Group or Social	Organizational
Knowledge Creation Model	X	X	X
Knowledge Cycle Model	–	–	–
Information Space Model	–	–	–
4I Framework of Organizational Learning	X	X	X
Holistic Theory of KM	X	X	X

Note: X = major focus; – = not discussed.

Following this line of thinking, we have identified six modes of KM as discussed in the previous section.

Conclusion

This article examines milestone KM models from a holistic perspective. Most of the models reviewed in the article touch on but do not incorporate an important aspect of knowledge—*affectual or critical knowledge*. Most models

do recognize the importance of organizational culture, relations among people or units, and other emotional factors, which demonstrate their agreement that this affectual facet of knowledge is indispensable because it describes people's or organizations' values, assumptions, and other knowledge that dictates the direction of their action. However, they do not integrate this facet into their KM models and so fail to provide a holistic account of what is happening and what ought to be. In addition, most existing KM models are at the conceptualization stage, and measurements and propositions have not undergone empirical examination. The next step is to generate indicators and measures from the KM models and subject them to empirical testing.

The holistic model of KM highlights the equal importance of the three facets of knowledge: conceptual, perceptual, and affectual. We think that explicit and implicit knowledge correspond to cognitive and behavioral domains that have received abundant consideration in past research, but the affectual knowledge is either totally neglected or externalized to be an environmental factor instead of something innate to a person or an organization's knowledge base. The practical implication of this view is that personal values or organizational culture is dealt with separately from rules, regulations, or experiences. However, in real life, personal values go hand in hand with a person's knowledge as a whole, and an organizational culture permeates every aspect of the organization's repertoire of knowledge. The artificial separation of affectual knowledge from others would lead to partial organizational solutions.

Within organizations, knowledge improvement initiatives may vary in several ways. For example, KM may be led by an exclusively titled knowledge manager empowered at the organizational level or by individuals at the group level within communities of practice, and to some degree just about everyone in an organization has a role to play in managing knowledge (Davenport & Prusak, 2000). In a review of 31 KM projects, Davenport and Prusak (2000) report differences between KM initiatives as some were centralized at the corporate level or decentralized in an organizational subunit, some were self-funded or funded as part of broader initiatives, and KM projects varied whether the program's aims are fundamental to an organization's existence or simply peripheral to the organization. However, all KM projects had in common identifiable knowledge objectives and a focus on knowledge outcomes rather than just data or information and have a clearly appointed leader managing them (Davenport & Prusak, 2000). Consequently, effective KM projects need to build a strong base of affectual knowledge that serves as a basis for creating, sharing, and using two other facets of knowledge. For example, existing studies have demonstrated that trust played a crucial role in the context of knowledge sharing (He, Fang, & Wei, 2009; Liao, 2009). In practice, HRD professionals need to first establish an organizational climate of trust and pay attention to affectual knowledge before a KM system is introduced. This may include designing and launching organization development interventions

that assess organizational members' attitudes about knowledge, communicating and preparing organizational members for the advent of KM initiatives, and involving organizational members in developing measures and metrics that are meaningful to their contexts. KM or HRD practitioners may be able to develop initiatives that more fundamentally use the critical facet to produce more productive and transformative learning environments, facilitate cultures that fully support knowledge access and sharing, and organizational participants that are more motivated to use new knowledge.

Because of the theorized interconnected nature of the knowledge facets according to the holistic model, all programs to facilitate knowledge creation, sharing, and use would be affected by technical (conceptual), contextual (perceptual), and critical (affectual) facets regardless of whether KM leaders have awareness or take actions for each facet. Most of the KM models reviewed in this article included implicit and explicit facets, but no model includes the critical (affectual) facet except for the holistic model. KM and HRD professionals need to be cognizant of the interconnected nature of the three facets of knowledge and correspondingly adopt a holistic approach to leverage the dynamic interrelations among the three facts. For example, practices need to be created that could help organizational members systematize their actual experience in the organizational life into explicit knowledge that the whole organization can share. Same things need to happen to help organizational members align their beliefs and their actual experiences as well as with their espoused knowledge. KM and HRD professionals need to take advantage of the interconnections of the three facets of knowledge and facilitate the interpenetration of the three facts so that knowledge could be consistently transferred and maximally utilized.

Overall, the holistic model of KM combines the affectual aspect with the conceptual and perceptual aspects of knowledge and so offers a more complete picture for practitioners when dealing with organizational issues and challenges. Technical (conceptual), practical (perceptual), and critical (affectual) aspects all need to be considered at the same time.

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