Beyond the ba: managing enabling contexts in knowledge organizations

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Abstract

Purpose – *Looking at the practical experience of organizations pursuing knowledge management, it is found that their efforts are primarily focused on creating the conditions and the context that will enable knowledge creation. This need for developing enabling conditions and contexts was identified more than a decade ago when Nonaka and associates introduced the concept of ''ba.'' This paper aims to map the development of the concept of ''ba'' in a number of disciplines in order to understand its theoretical evolution and practical application.*

Design/methodology/approach – *A comprehensive search and evaluation of the literature resulted in a database of 135 papers, four dissertations and four books. Using content analysis, citation analysis, and concept mapping, four categories of research findings are identified that in turn suggest four groups of conditions for enabling knowledge creation.*

Findings – *The paper discusses each of these conditions (the social/behavioral, cognitive/epistemic, information systems/management, and strategy/structural), and introduces a framework that relates these conditions to the type of knowledge process and the level of interaction that characterize a knowledge management activity in the organization.*

Originality/value – *It is concluded that managing knowledge in organizations is fundamentally about creating an environment in the organization that is conducive to and encourages knowledge creation, sharing and use. Organizations interested in pursuing knowledge management and innovation may wish to be guided by the enabling conditions presented here that have been discovered over ten years of research. These conditions and the frameworks of which they are part can help managers to analyze, discuss, and introduce specific combinations of enabling factors that are tailored according to the type of knowledge process and level of interaction needed to address a particular knowledge problem or vision.*

Keywords *Knowledge management, Knowledge organizations*

Paper type *Research paper*

1. Introduction

The management of organizational knowledge is really about managing the context and conditions by which knowledge can be created, shared, and put to use towards the attainment of organizational goals.

This insight of managing knowledge as managing an enabling context is not in fact new. The idea was inherent in the introduction of the concept of ''ba'' by Ikujiro Nonaka and associates ten years ago as a shared context that supports knowledge creation and use. If we trace the development of the ba concept then we are tracing the growth of our understanding about managing knowledge as managing a requisite set of enabling organizational conditions.

This paper therefore has two objectives. First, it presents a review of the literature on ba or enabling context as a conceptual framework for analyzing knowledge creation. Second, based on the review, we identify a number of overarching themes that suggest four sets of enabling conditions that need to be considered in the creation and management of ba.

An innovative feature of this paper is the use of the conceptual mapping approach to visualize the literature and their inter-relationships.

The original impetus for this paper was a series of studies conducted by one of the authors (Alvarenga Neto, 2005, 2008; Alvarenga Neto *et al.*, 2009) where the importance of the concepts of ba, enabling context and enabling conditions turned out to be a main result. The studies examined the KM initiatives of 23 international firms, such as 3M, Dow Chemical, Xerox, PricewaterhouseCoopers, Siemens, CTC (Brazil's Sugarcane Technology Center), Ernst & Young, British Telecom, Microsoft, Novartis and Chevron, among others. These case studies collected data using several methods, including semi-structured interviews, document analysis, and direct observation. The main results suggested that these organizations were not ''managing knowledge'' as such, but were rather managing the context and readiness whereby knowledge is socially constructed, produced and shared, and the main challenges facing organizations committed to KM were in change management, cultural and behavioral issues, and the creation of an enabling context that encourages the creation, sharing and use of knowledge:

> [. . .] within KM, what is managed is not knowledge itself, but solely the context where knowledge emerges and is socially constructed (''ba''). [. . .] knowledge as such cannot be managed; it is just promoted or stimulated through the creation of a favorable organizational context. There is strong qualitative evidence of a major shift in the context of the organizations contemplated in this study: from ''knowledge management'' to the ''management of 'ba' and the enabling conditions'' that favors innovation, sharing, learning, collaborative problem solution and tolerance to honest mistakes, among others. (Alvarenga Neto, 2005, p. 372; Alvarenga Neto, 2007, p. 152; Alvarenga Neto, 2008, p. 209).

As a result of this finding, we decided to explore the concept of ba further by systematically analyzing the research that has been done in that area. This paper is in five sections: this introduction, the methodology, the literature review, analysis of the literature, and conclusions and implications.

2. Methodology

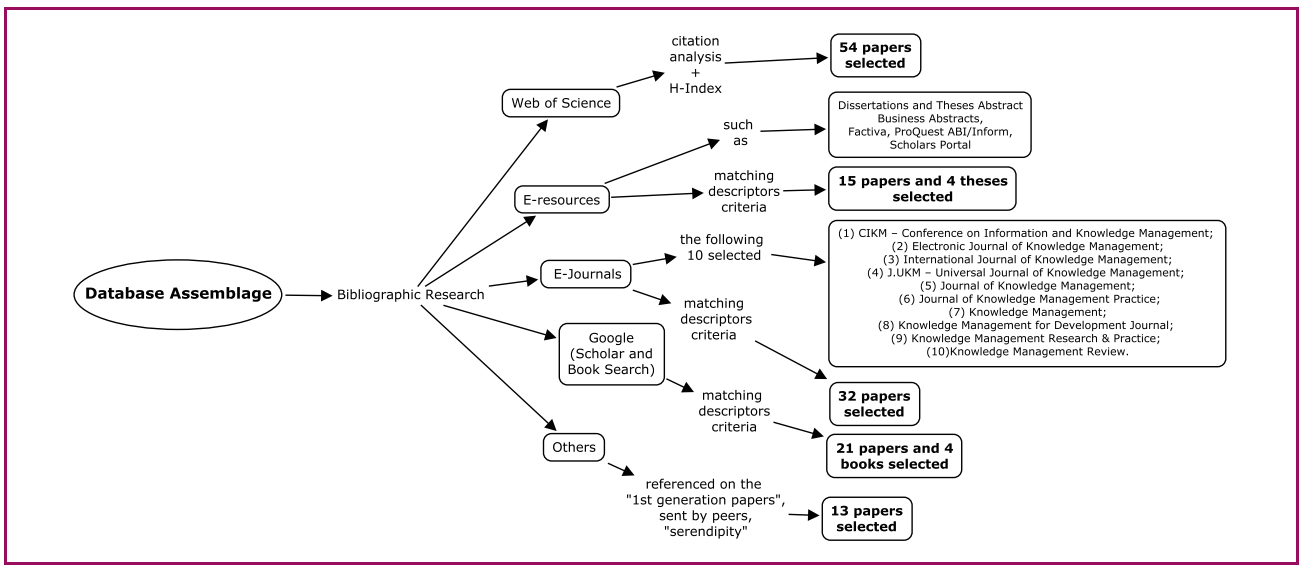
The research method adopted is bibliographic in nature, using a range of bibliometric tools to carry out citation analysis and content analysis. To begin with, we searched the ISI Web of Knowledge databases to retrieve articles on ''ba,'' ''concept of ba,'' and ''Ikujiro Nonaka.'' Search results showed that four of Nonaka's papers were cited 592 times since 1998 in papers all over the world, with an average of 49 citations per year (hereafter, we refer to Nonaka's original papers on ba as ''first generation papers'' and all of the other papers citing Nonaka's ba or enabling context concepts as ''second generation papers'').

We then expanded our search to retrieve more papers discussing the concept of ba and its underlying concepts. We added search terms such as ''enabling context'', ''enabling conditions'' and ''enabling knowledge creation'' to the existing descriptors, as these terms were highly cited in the references of the ''first generation papers.'' Figure 1 shows the expanded search strategy which included these sources:

- University of Toronto digital library resources;
- e-journals containing ''Knowledge Management'' in their titles;
- Google Scholar and Google Book Search (searching for material not previously published in the form of journal papers) – extra search criteria using authors' names from the ''first generation papers'' or authors cited by the ''first generation papers''; and
- papers cited in the references of the ''first generation papers,'' papers sent to us by peers or found serendipitously.

This expanded search strategy resulted in a corpus of 135 papers, four dissertations and four books that constituted the study's database. The time-span covers papers published from 1991 to 2009 and the authors were academics and practitioners from many different counties such as Japan, Finland, Portugal, Brazil, Canada, The Netherlands, Spain, France,

Figure 1 Literature search strategy



Greece, Great Britain, South Korea, USA, Australia, China, Italy, Israel, Germany and South Africa among others.

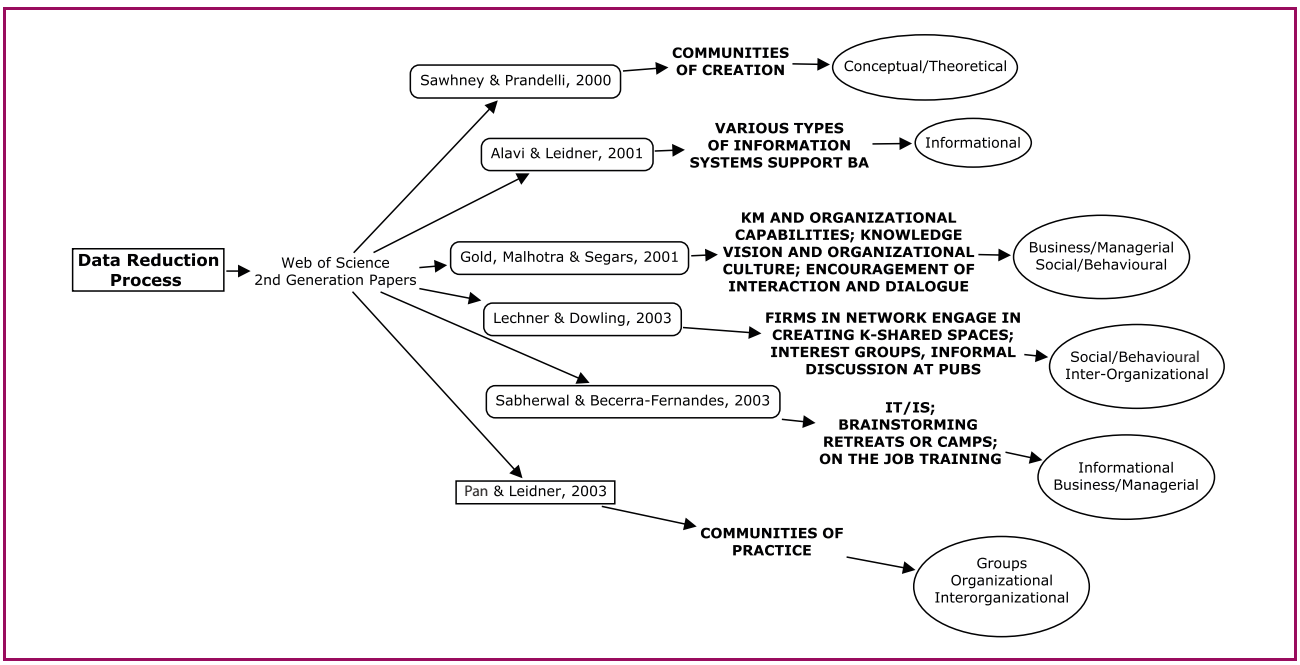
Miles and Huberman (1984) suggested that qualitative data analysis should occur in three concurrent flows of activities: data reduction, data display, and conclusion drawing/verification (or in this study, the extraction of categories). Displays in the form of conceptual maps proved useful for all three flows of data analysis, especially in identifying analytical categories. Seven data reduction cycles were necessary in order to analyze and synthesize the literature. Concept maps were created using CmapTools, a software environment developed at the Institute for Human and Machine Cognition that allows researchers to construct and analyze large representations of complex domains (Cañas *et al.*, 2004).

Figure 2 is a simplified example of how data reduction was carried out. Each of the papers, dissertations and books selected for the database was carefully analyzed in order to extract its main descriptors, ideas, concepts and associations with the concepts of ba, enabling context, enabling conditions and enabling knowledge creation. For each resource type, e.g. e-journals, a concept map (data display) was constructed. Initially, five data reduction cycles were expected, as five different resource types were chosen for our research database (Figure 1). In the subsequent analysis of two resources – Web of Science and E-Resources – two more reduction cycles were found to be necessary, as we had a greater number of papers selected for the first (54 papers), and we felt the need to separate the analysis of papers from dissertations in the latter.

3. Literature review: the concept of ba as shared space for knowledge creation

Nonaka and Konno (1998) started the discussion that led to the concept of ba by asking: ''Is it possible to actually manage knowledge like other resources?'' In order to address this question, they introduced the concept of ''ba'', roughly translated into the English word ''space''. They stated that the concept of ''ba'' was proposed by Japanese philosopher Kitaro Nishida (1990) and further developed by Shimizu (1995). This ''space for emerging relationships'' can be physical (e.g. office, dispersed business space), virtual (e.g. e-mail, teleconference), mental (e.g. shared experience, ideas, ideals), or any combination of them. It is stressed that the difference between ''ba'' and ordinary human interaction is the goal of knowledge creation: ''we consider 'ba' to be a shared space that serves as a foundation for knowledge creation'' (Nonaka and Konno, 1998, p. 40).

Figure 2 Example of data reduction/analysis



Nonaka *et al.* (2000) assert that knowledge needs a context to be created, since ''there's no creation without place'':

> [. . .] in knowledge creation, generation and regeneration of ba is the key, as ba provides the energy, quality and place to perform the individual conversions and to move along the knowledge spiral. [. . .] it is a concept that unifies physical space such as an office space, virtual space such as e-mail, and mental space such as shared ideals. [. . .] ba is a time-space nexus, or as Heidegger expressed it, a locationality that simultaneously includes space and time. [. . .] knowledge is created through the interactions amongst individuals or between individuals and their environments. [. . .] ba is the context shared by those who participate in ba. [. . .] ba is the place where information is interpreted to become knowledge (Nonaka *et al.*, 2000, p. 14).

Nonaka and Toyama (2002) provide another useful summary of the ba concept:

> [. . .] knowledge does not just exist in one's cognition, rather, it's created in situated action. Ba offers a context and is defined as a shared context in motion, in which knowledge is shared, created and utilized, ba is a place where information is given meaning through interpretation to become knowledge, and new knowledge is created out of existing knowledge through the change of the meanings and contexts. [. . .] Ba can emerge in individuals, working groups, project teams, informal circles, temporary meetings, virtual space, such as e-mail groups, and at the front-line contact with the customer. Ba is an existential place where participants share their contexts and create new meanings through interactions. Ba is a way of organizing that is based on the meaning it creates, rather than a form of organizations such as a bureaucracy or network. [. . .]ba involves various contradictions (Nonaka and Toyama, 2002, p. 1001).

3.1 Ba in the theory of organizational knowledge creation

Over the years, Nonaka and associates expanded their work into a more general theory of organizational knowledge creation, in which the concept of ba and enabling conditions play a pivotal role:

> [. . .] Organizational knowledge creation is defined as the process of making available and amplifying knowledge created by individuals as well as crystallizing and connecting it to an organization's knowledge system. [. . .] Organizational knowledge creation theory proposes concepts and relationships regarding organizational enabling conditions and ba, organizational forms, as well as leadership that explain the conundrum of firm differences, and hence provide the building blocks of a knowledge-based theory of the firm. Due to the inter-subjective nature of

knowledge, firms differ because organizational knowledge creation gives rise to unique organizational knowledge systems (Nonaka *et al.*, 2006, pp. 1179-1193).

Figure 3 shows the key elements of their theory of organizational knowledge creation: the SECI knowledge creation process; ba; and knowledge assets and leadership. The theory suggests that a firm can create new knowledge by aligning its knowledge vision, ba, creative routines, incentive systems and leadership (left side of Figure 3). Furthermore, Nonaka *et al.* (2006) discuss ba in relation to enabling conditions such as care, trust, courage, team atmosphere and information technology, as well as the concepts of ''knowledge vision,'' ''knowledge activism'' and a ''hypertext organization'' (right side of Figure 3).

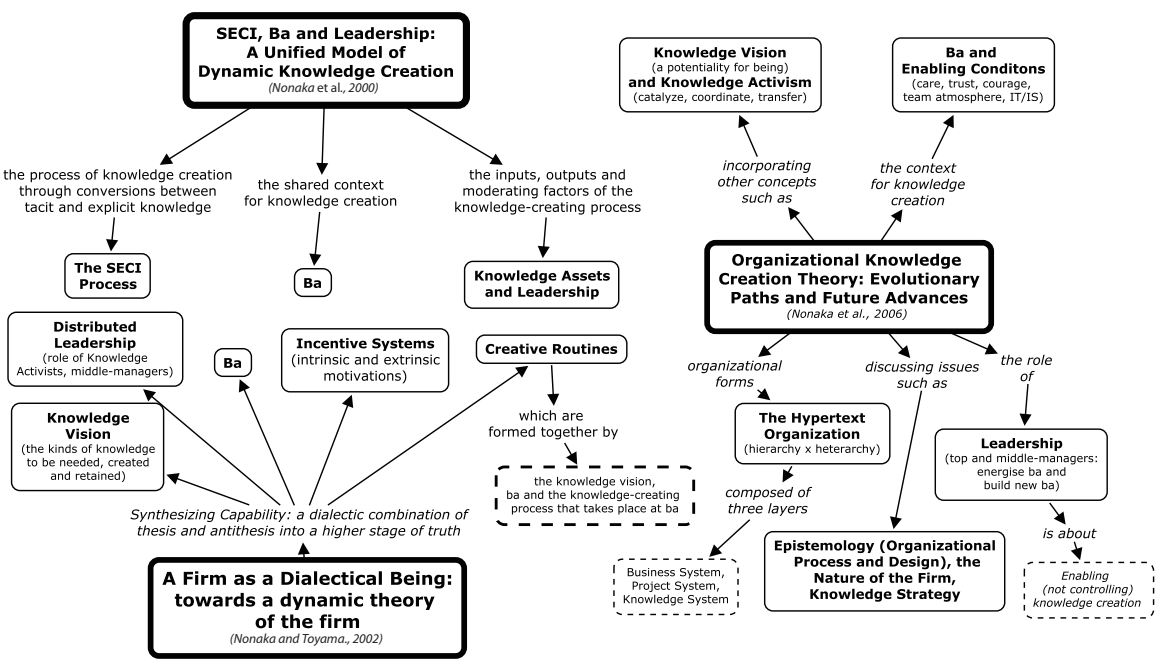
In the following paragraphs, we discuss ba in relation to the other principal components of the theory: SECI process, knowledge assets, and leadership.

Ba and its relationship to SECI process. SECI refers to the four processes of knowledge creation identified by Nonaka and associates: Socialization that transfers tacit knowledge; Externalization that converts tacit knowledge into explicit knowledge; Combination that integrates explicit knowledge; and Internalization that embodies new tacit knowledge. In Nonaka and Konno's (1998) view, ''ba'' offers an integrating metaphor for the four SECI processes by supporting the continuous interaction between tacit and explicit knowledge.

As shown in Figure 4, four types of ''ba'' correspond to the four processes of the SECI model:

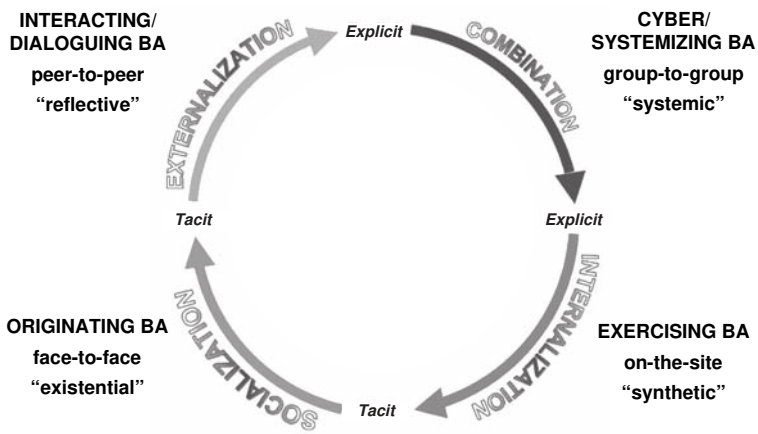
1. *Originating ba*. The world where individuals share feelings, emotion, experiences and mental models; emergence of care, love, trust and commitment; direct encounter between individuals; physical, face to face experiences are key to conversion and transfer of tacit knowledge; related organizational issues are knowledge vision and culture, open organizational designs, customer interfaces;
2. *Interacting/dialoguing ba*. More consciously constructed than the former; critical issue is selecting people with the right mix of specific knowledge and capabilities for a project team, taskforce or cross-functional team; this ba has a reflective characteristic; tacit

Figure 3 Theory of organizational knowledge creation



Source: Nonaka *et al*. (2000, 2006); Nonaka and Toyama (2002)

Figure 4 Four types of ba



Sources: Adapted from Nonaka and Konno (1998); Nonaka *et al.* (2000)

knowledge is made explicit and dialogue is key for such conversions; extensive use of metaphors;

3. *Cyber/systemizing ba*. Place of interaction in a virtual world; the combination of explicit knowledge is most efficiently supported in collaborative environments utilizing IT: online networks, intranets, portals, groupware, documentation and databases; this ba is systemic or system-mediated in its nature;

4. *Exercising ba*. Supports the internalization phase of the SECI model; focused training with senior mentor and colleagues; rather than teaching based on analysis, learning by continuous self refinement through OJT (on-the-job training) or peripheral and active participation; this ba is synthetic.

3.1.1 Ba and its relationship to knowledge assets. For Nonaka and associates, knowledge exists and resides in ''ba,'' or, in the authors' words, ''knowledge is embedded in ''ba'' or the shared spaces.'' Moreover, the use of knowledge requires the concentration of knowledge assets at a certain time and space and they call this ''organic concentration'':

> [. . .] ba is the platform for the ''resource concentration'' of the organization's knowledge assets and the intellectualizing capabilities within the knowledge-creating process (Nonaka and Konno, 1998, p. 41).
>
> [. . .] in summary, using existing knowledge assets, an organization creates new knowledge through the SECI process that takes place in ba, where new knowledge, once created, becomes in turn the basis for a new spiral of knowledge creation (Nonaka *et al.*, 2000, p. 5).

3.1.2 Ba and leadership. Nonaka and Konno (1998) illustrate the concept of ''ba'' through extensive cases drawn from Sharp (project teams or Urgent Teams as ba for knowledge creation), Toshiba (a boundary-spanning division as ba) and Maekawa Seisakusho (organizational design as a platform/ba for knowledge creation). They concluded that the role of top management is to provide the ''ba'' for knowledge creation and their main task is to manage for knowledge emergence. Not only does the success of knowledge creation depend on manager's assumption of responsibility, justification, financial backing, but also on top management's realization that knowledge needs to be nurtured, supported, enhanced and cared for. To energize ba, middle-managers have to create the necessary conditions, such as autonomy, creative chaos, redundancy, requisite variety, love, care, trust and commitment (Nonaka *et al.*, 2000).

3.1.3 Criticism of ba. Most criticism of Nonaka's work on organizational knowledge creation has been directed at the conceptualization of tacit knowledge and its conversion into explicit

knowledge. This criticism is relevant to our discussion here as knowledge creation and conversion would take place in the originating and dialoguing ba. In a recent paper, Nonaka and von Krogh (2009) address this knowledge conversion ''controversy'' by responding to a critique of the home bakery product development example:

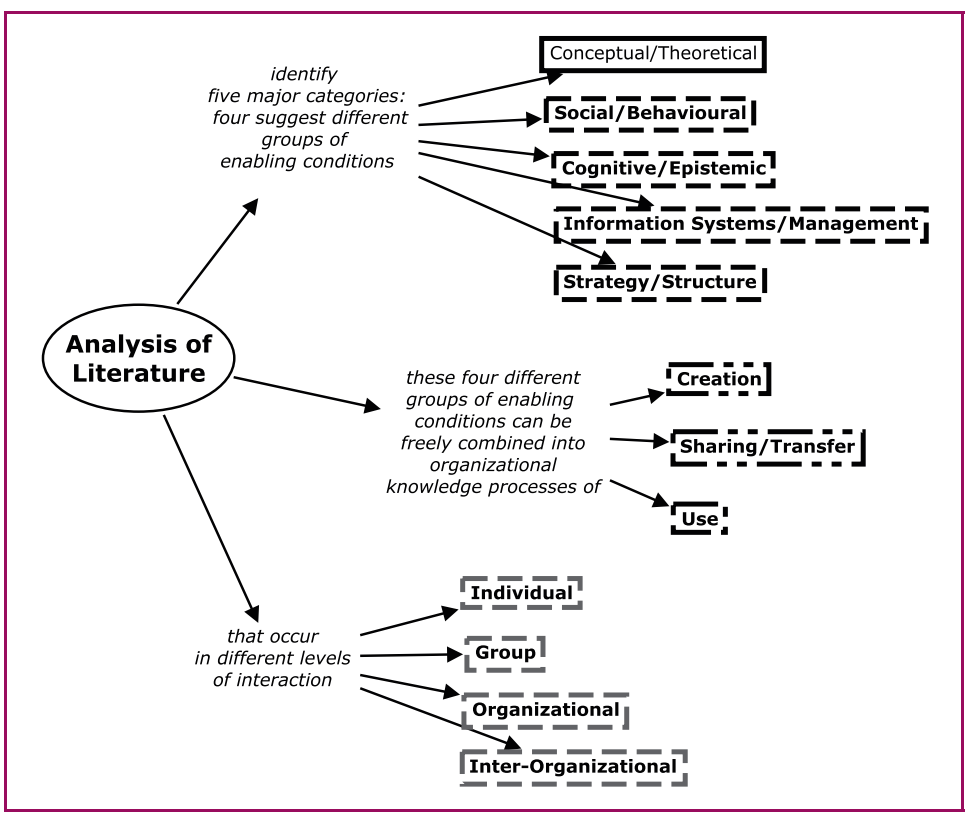
> . . . we can now return to the analysis by Ribeiro and Collins (2007) of knowledge conversion performed by Tanaka and the home-bakery product development group. The conversion of knowledge from a tacit towards an explicit form is inherently a creative act using metaphors, analogies, and images (Nonaka, 1991). An example is the concept of ''twisting stretch.'' Knowledge conversion in this case is not about Tanaka representing tacit knowledge of the master baker or the social practice of baking bread (that Tanaka became a member of) in the concept of ''twisting stretch.'' In fact, this would have to presuppose a different understanding of ''truth'' than the one adopted in the definition of knowledge. Rather, knowledge conversion is about expanding the previous boundaries of the knowledge of the individuals (Tanaka learning to bake with the master baker) and the team (Tanaka developing the concept of ''twisting stretch'') for the larger organization to be innovative. . . . The concept of knowledge conversion is fundamental to organizational knowledge creation theory and important to organization science, because it explains how new ideas come forth in innovation, not only how individuals tap into rich practices and acquire the tacit knowledge of these practices (Nonaka and von Krogh, 2009, p. 645).

Thus, by knowledge conversion, Nonaka refers more to a process by which new knowledge becomes available and accessible to the wider organization so that the new idea or insight could be discussed, worked on, and developed further.

3.2 Theoretical development of the ba concept

In this section, we analyze ''the second generation papers'' in our research database. Through data analysis and data reduction, five major categories emerged as ways of organizing our research findings, as shown in Figure 5 (top branch). The first category is labeled conceptual/theoretical, and refers to articles where the concept of ba was used for

Figure 5 Four major groups of enabling conditions identified from literature analysis



new conceptual or theoretical development; and to papers by Nonaka and colleagues that introduced further theoretical and empirical support to their concept of ba.

The remaining papers fall into four categories that suggest four sets of enabling conditions as follows:

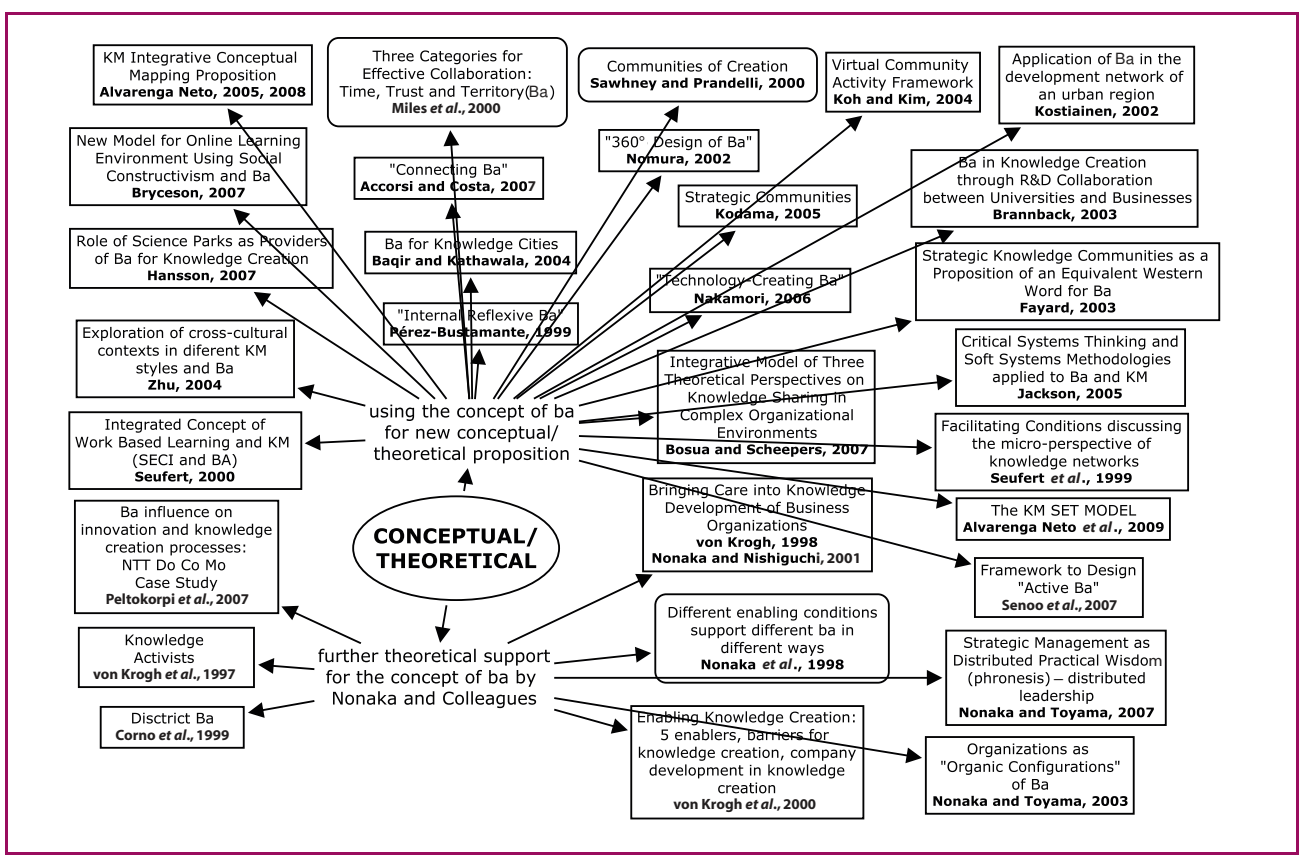
1. *Social/behavioral*: social relationships and interactions based on norms and values such as trust, care, empathy, attentive enquiry and tolerance.
2. *Cognitive/epistemic*: the need for both epistemic diversity and common knowledge or shared epistemic practices and commitments.
3. *Information systems/management*: the use of it, information systems, and information management processes to support knowledge activities.
4. *Strategy/structure*: the need for the organization and its management to provide direction and structure.

In the literature, these four groups of enabling conditions were discussed in relation to three different knowledge processes – creation, sharing/transfer, use; that occur at different levels of interaction – individual, group, organizational, inter-organizational (see Figure 5).

The rest of this section focuses on the first category (conceptual/ theoretical). The next section (section 4) examines each group of enabling conditions separately.

In terms of conceptual and theoretical development, Figure 6 shows two main trajectories. In the first trajectory, ''using the concept of ba for new conceptual/theoretical proposition,'' there are two variations:

Figure 6 Conceptual/theoretical development of ba



1. Using ba as either the basis for, or component of, other theoretical propositions, where the main objective of the authors were not its theoretical exploration or development, e.g. Miles *et al.* (2000), Sawhney and Prandelli (2000), Kodama (2005), Bryceson (2007) and Alvarenga Neto (2008, 2009).
2. Discussing the concept of ba in different contexts – such as science parks (Hansson, 2007), knowledge cities (Baqir and Kathawala, 2004), R&D collaboration between universities and businesses (Brannback, 2003), and in the development network of an urban Region (Kostiainen, 2002).

The second trajectory, ''further theoretical support for the concept of ba by Nonaka and colleagues,'' forms the bulk of what has been added to the theoretical development of ba and includes works such as: the concept of knowledge activism (Von Krogh *et al.*, 1997), care in knowledge creation (Von Krogh, 1998; Nonaka and Nishiguchi, 2001), enabling conditions supporting different ba in different ways (Nonaka *et al.*, 1998), district ba (Corno *et al.*, 1999), enabling knowledge creation and a company's development in knowledge creation (Von Krogh *et al.*, 2000), dialectic thinking, contradictions and ''organic configurations of ba'' (Nonaka and Toyama, 2003), flexible and distributed leadership connecting and energizing ba (Nonaka and Toyama, 2007), and a holistic view of contextual innovation, knowledge creation processes and interlinked systems of shared contexts or ba (Peltokorpi *et al.*, 2007). Only a few other authors proposed new concepts as extensions to the original theoretical framework, such as ''the internal reflexive-ba'' (Pérez-Bustamante, 1999), ''technology-creating ba'' (Nakamori, 2006), ''active ba'' (Senoo *et al.*, 2007) and ''connecting ba'' (Accorsi and Costa, 2007), among others.

It is worth noting that ba and enabling context were often used as synonyms:

> [. . .] effective knowledge creation depends on an enabling context. What we mean by enabling context is a shared space that fosters emerging relationships. Based on the Japanese idea of ba (or ''place''), such an organizational context can be physical, virtual, mental, or – more likely – all three. [. . .] you might say that knowledge is embedded in ba, and that supporting the whole process of knowledge creation requires the necessary context or ''knowledge space'' (Von Krogh *et al.*, 2000, p. 7).

4. Analysis of the literature: enabling conditions for an enabling context

4.1 Social/behavioral: social relationships and interactions

As mentioned above, the four remaining major categories of the literature analysis identify four different groups of enabling conditions. The first group of conditions is social/behavioral. It recognizes the need for fostering interpersonal relationships and interactions based on norms and values such as care, trust, and a willingness to experiment, all of which help form a social environment conducive to knowledge creation, sharing and use. Our literature review suggests that the following would be important elements of this group of social/behavioral conditions:

- norms of care, mutual trust, lenience in judgment, active empathy, courage and access to help (Inkpen, 1996; Von Krogh, 1998; Burton, 2002; Lee and Choi, 2003; Von Krogh *et al.*, 2008);
- tolerance to ''honest'' mistakes and mutual respect (Alvarenga Neto, 2005);
- active encouragement of participation, nurture of innovating language while avoiding hypercorrection (Von Krogh *et al.*, 2000);
- accessibility of individuals and attentive inquiry (Nonaka and Nishiguchi, 2001);
- interaction and open dialogue (Gold *et al.*, 2001; Sabherwal and Becerra-Fernandez, 2003);
- collaboration (Lee and Choi, 2003);
- autonomy of freedom (Ford and Angermeier, 2004); and
- contextual social interactions and evolving relationships (Peltokorpi *et al.*, 2007).

These excerpts from the literature elaborate on some of these elements:

> [. . .] However, in our search for enabling conditions, we have found values guiding relationships in organizations to be of particular importance, and the value of care in organizations relationships is one key enabling condition. [. . .]Bear in mind that what will make or break the transformation into a ''knowledge-creating company'' will not be the overall structural approaches of ''managing knowledge'', but your sensitivity to the way people relate (Von Krogh, 1998, p. 136).
>
> [. . .]to accomplish this it's necessary to stress the importance of employee interaction for building relationships and contacts that enable the share of different perspectives (Gold *et al.*, 2001, p. 95).
>
> [. . .] the creation of the enabling context or ba. [. . .] values. [. . .] tolerance to honest mistakes (Alvarenga Neto, 2005, p. 263).

4.2 Cognitive/epistemic: epistemic diversity and common knowledge

Our second group of enabling conditions, cognitive/epistemic, is related to two initially opposing requirements: the need for knowledge that is diverse and represents different backgrounds and cognitive styles; and the need for common knowledge based on shared beliefs and mental models. Both requirements need to reinforce each other: the existence of shared beliefs and ideas should be based on embracing the ideas and experiences of people with different backgrounds and perspectives. What is implied is that there are methods and practices that the group will use to tap into and combine the diverse knowledge of its members (what Nonaka and associates refer to as the ''organic concentration'' of knowledge). Our literature review suggests that the following would be important elements of this group of enabling conditions:

- Exposure to a great variety of data, insights, questions, ideas and problems (Von Krogh *et al.*, 1997).
- Application of creative techniques for metaphors, analogies and insights (Von Krogh *et al.*, 1997; Burton, 2002).
- A sound mix of people from various cultural backgrounds and functional areas (Von Krogh *et al.*, 1997), existence of diverse perspectives and backgrounds (Gold *et al.*, 2001; Peltokorpi *et al.*, 2007) and existence of inter-organizational communities formed by people with different mindsets and mental models (Von Krogh *et al.*, 2008).
- Formal and informal groups or communities (e.g. micro-communities of knowledge) with their own rituals, languages, norms and values (Von Krogh *et al.*, 1997); creation of shared spaces and shared goals (Lechner and Dowling, 2003; Von Krogh *et al.*, 2008; Balestrin *et al.*, 2008; Brannback *et al.*, 2008), and the sharing of mental models (Burton, 2002).
- Development of dialectical thinking (Nonaka and Toyama, 2002) and a legitimate language (Von Krogh *et al.*, 2000), as well of awareness of company paradigms, in terms of values, strategic intention and mission (Von Krogh *et al.*, 2000).
- Creating conditions such as creative chaos (Inkpen, 1996), intention and requisite variety (Johnson, 2000).
- Production and sharing of practical knowledge, meeting in different constellations and creation of common knowledge (Alavi and Leidner, 2001; Roth, 2003).

These excerpts from the literature elaborate on some of these elements:

> [. . .] The existence of formal and informal situations so that the businessmen can share abilities, experiences, emotions and know-how, by means of face-to-face communication, promoted an environment of intense sharing of tacit knowledge (Balestrin *et al.*, 2008, p. 103).
>
> [. . .] being exposed to a great variety of data, insights, opportunities, questions, ideas, issues and problems; picking on those signals and formulating ''process triggers'' in the form of questions ''why, how, what, where, when and who''; being aware that the space or a context for knowledge creation requires an innovative blending of architectural innovations, intervention and moderation techniques (encouragement, setting of the rules, applying of creative techniques for metaphors, analogies and insights); and a sound mix of people from various cultural

backgrounds and functional areas. [. . .] these communities are characterized by its own rituals, languages, norms and values [. . .] in the minds of each lives the image of their communion (Von Krogh *et al.*, 1997, p. 476).

[. . .] recognition of new businesses opportunities might require an innovative vocabulary that includes words like neutraceuticals, infotainment, edutainment, or cybershopping. [. . .] the articulation of new knowledge requires a process in which people move from broad distinctions to increasingly fine ones. [. . .] a company's strategic intent, vision or mission statements, and core values constitute its paradigm or worldview. Paradigms influence an organization's daily life: defining the themes discussed in management meetings, the language used, the routines followed and even data and information employees are likely to search for as well as how the data should be interpreted'' (Von Krogh *et al.*, 2000, pp. 22-25).

4.3 Information systems/information management

The third group of enabling conditions stresses the use of information technology and information systems, within a planned information management framework. The literature suggests that the use of IT/IS can significantly increase the scale, reach, and efficiency of knowledge sharing and access across an organization. Included in this category are the activities to capture and store knowledge – the managed process of codifying, storing knowledge, and providing efficient access to it. Here we need to be mindful about over-emphasizing the role of IT: IT is a tool, not an end in itself. KM and IT are not synonymous. KM is an organizational process that can be supported by the appropriate use of IT as part of the enabling context (ba). The use of IT is much discussed in the KM literature, and here we list example applications that are drawn from the papers analyzed in our study:

- internet, intranet, yellow pages, business information systems, groupware, databases, data warehousing, data mining, document repositories, software agents, repositories of information, best practices and lessons learned (Von Krogh *et al.*, 1997, 2000; Nonaka *et al.*, 1998; Alavi and Leidner, 2001; Sabherwal and Becerra-Fernandez, 2003; Chou and Wang, 2003; Lee and Choi, 2003);
- Information systems designed to support collaboration, coordination and communication processes as a mean to facilitate teamwork and increase an individual's contacts with other individuals (Alavi and Leidner, 2001);
- e-mails and group support system; increase the number of weak ties in organizations (Alavi and Leidner, 2001; Chou and Wang, 2003);
- computer simulation and smart software tutors to support individual learning in intranet environments (Alavi and Leidner, 2001; Tee, 2005);
- computer-mediated communication as a forum for constructing and sharing beliefs, for confirming consensual information, and for allowing expressing of new ideas (Alavi and Leidner, 2001);
- problem-solving systems based on a technology like case-based reasoning (Sabherwal and Becerra-Fernandez, 2003); and
- virtual communities of practice (Pan and Leidner, 2003; Alvarenga Neto, 2005).

These excerpts from the literature elaborate on some of these elements:

[. . .] Data warehousing and data mining, documents repositories, and software agents, for example, may be of great value in cyber ba. We further suggest that considering the flexibility of modern IT, other forms of organizational ba and the corresponding modes of knowledge creation can be enhanced through the use of various forms of information systems (Alavi and Leidner, 2001, p. 117).

[. . .] This study suggests that organizational ba and information distribution can be facilitated by the use of various capabilities of modern IT. For example, IS designed for supporting electronic repositories, collaboration, communication, e-mail, and simulation software, can facilitate teamwork, exchanging and organizing knowledge as well as individual learning (Chou and Wang, 2003, p. 176).

4.4 Strategy/structure: business vision and managerial support

The last group of conditions refers to the organization's strategy and structure as they relate to the creation and functioning of the ba. While our earlier conditions have emphasized the need for social interaction and cognitive diversity, implying that there are important aspects of the ba that are self-organizing and adaptive, this set of conditions stresses the need for the organization to also provide a degree of structure and direction to the knowledge creation activities. Our literature review suggests that the following would be important elements of this group of enabling conditions:

- *Strategy and knowledge vision*. How would the ba and knowledge creation contribute to organizational success? What is the strategic problem to be solved? Communication of the company's strategy and knowledge vision (Alvarenga Neto, 2005); instill a knowledge vision (Von Krogh *et al.*, 2000; Peltokorpi *et al.*, 2007).
- *Organizational structure*. Work structures that foster solid relationships and effective collaboration, such as project teams, cross-divisional units and empowered divisions, among others (Von Krogh *et al.*, 2000; Lee and Choi, 2003); systems-based approach, hypertext organization (Gold *et al.*, 2001; Nonaka *et al.*, 2006); autonomous and self-organizing teams (Peltokorpi *et al.*, 2007).
- *Learning and sharing incentives*. Reward systems linked to knowledge-sharing (Von Krogh *et al.*, 2008); flexible learning objectives (Inkpen, 1996); cultivation of care through incentive systems, mentoring and training programs, project debriefing and other forms of learning-oriented conversations (Von Krogh, 1998); use of apprentice and mentors to transfer knowledge, brainstorming retreats or camps, employee rotation, OJT, learning-by-doing and learning by observation (Sabherwal and Becerra-Fernandez, 2003); development of adequate team-atmosphere (Zarraga and Bonache, 2005).
- *Emergence of knowledge facilitators and knowledge activists*. Such as knowledge evangelists, champions, knowledge managers, information analysts, CEO, CKO, project managers and middle managers, among others (Von Krogh *et al.*, 1997, 2000; Roth, 2003; Alvarenga Neto, 2005; Nonaka *et al.*, 2006); a company as a knowledge activist (Von Krogh *et al.*, 2008); role of mediators as enablers in knowledge creation (Jyrama and Ayvari, 2005).
- *Leadership*. Leadership styles and roles of leadership (Von Krogh *et al.*, 2008; Ford and Angermeier, 2004); leadership commitment (Inkpen, 1996); overall direction and knowledge vision (Von Krogh *et al.*, 1997, 2000); phronesis (intellectual virtue) and flexible and distributed leadership (Nonaka and Toyama, 2007); role of top-management directing knowledge-creation processes by creating vision and the role of middle-managers bridging top-management vision with the chaotic reality at front line, also managing and interlinking ba (Peltokorpi *et al.*, 2007).
- *Architectural innovations*. Creation of meeting and sharing spaces/points (Balestrin *et al.*, 2008; Lechner and Dowling, 2003; Alvarenga Neto, 2008); design of virtual and physical layout and workplaces environments (Von Krogh *et al.*, 1997; Alvarenga Neto, 2005); promotion of regular knowledge conferences and support of micro-communities of knowledge (Von Krogh *et al.*, 2000); stimulus to social and informal gatherings (Bennett, 2001).
- *Organizational and inter-organizational processes*. Extending the concept of ba to business processes such as salesforce management (Bennett, 2001), project risk management (Cuellar and Gallivan, 2006), supply-chain (Wu, 2008), inter-organizational healthcare communities (Von Krogh *et al.*, 2008), firms in networks (Lechner and Dowling, 2003), transnational projects (Adenfelt and Lagerstrom, 2006), family business context (Brannback *et al.*, 2008), industrial districts (Corno *et al.*, 1999) and collaborative inter-organizational R&D projects (Johnson, 2000).

These excerpts from the literature elaborate on some of these elements:

> [. . .] Ba is not a concept associated with any particular size of business or organizational structure; rather, it appears that the extent of ba within an enterprise depends on managerial attitudes, traits and dispositions (Bennett, 2001, p. 198).

> [. . .] This paper aims to analyze how organizational conditions, technology adoption, supplier relationship management and customer relationship management affect knowledge creation through socialization-externalization combination, internalization (SECI) modes, and various ba, as proposed by Nonaka and Konno, in a supply chain (Wu, 2008, p. 241).

Figure 7 brings together the four groups of enabling conditions.

5. Conclusions and implications

An objective of the paper is to trace and analyze the development of the concept of ba – or enabling context – in the fields of information science, management/business and information systems literature in order to understand its conceptual evolution, application, and expansion since its introduction in 1998 by Nonaka *et al.* (1988). Figure 8 summarizes the overall study and highlights the major research directions in the literature on ba as enabling context: developing the concept, identifying types and forms, case studies, emergence of ba, expanding the ba concept for future research, and applying and developing the ba framework. As detailed in earlier sections, our analysis of the literature has found that the concept of ba and its extensions are indeed important conditions for organizational knowledge creation and innovation.

More specifically, our analysis led to the identification of four major sets of enabling conditions – social/behavioral, cognitive/epistemic, information systems/management, and strategy/structural – which would need to be managed to support different types of knowledge processes (knowledge creation, sharing/transfer, use) at different levels of interaction (group, organizational, inter-organizational). Figure 9 shows how these variables together form a framework that can help organizations think through the linkages between enabling conditions, knowledge process types, and interaction levels.

The enabling conditions identified in this study are consistent with those found in other studies. In a comprehensive survey of KM frameworks from science, practice, associations and standardization bodies, Heisig (2009) concluded that:

Figure 7 Analysis of the four major groups of enabling conditions

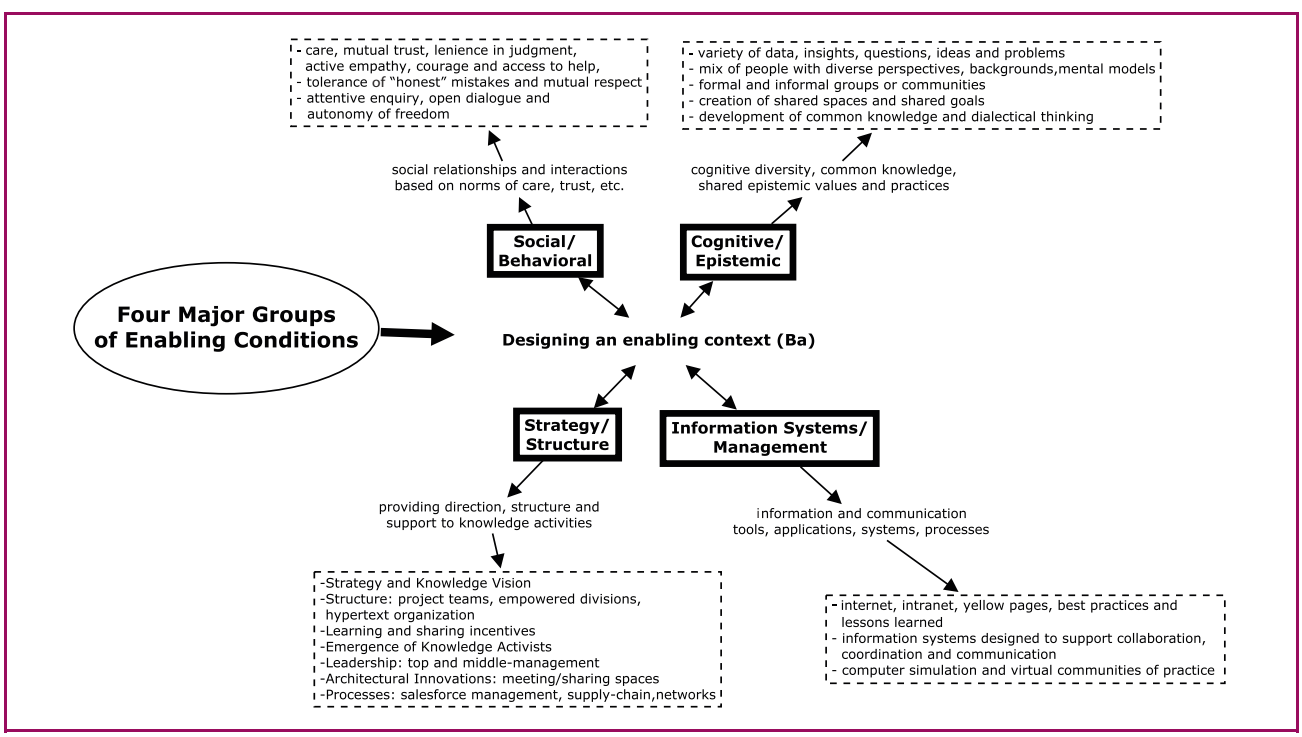


Figure 8 Expanding the concept of ba

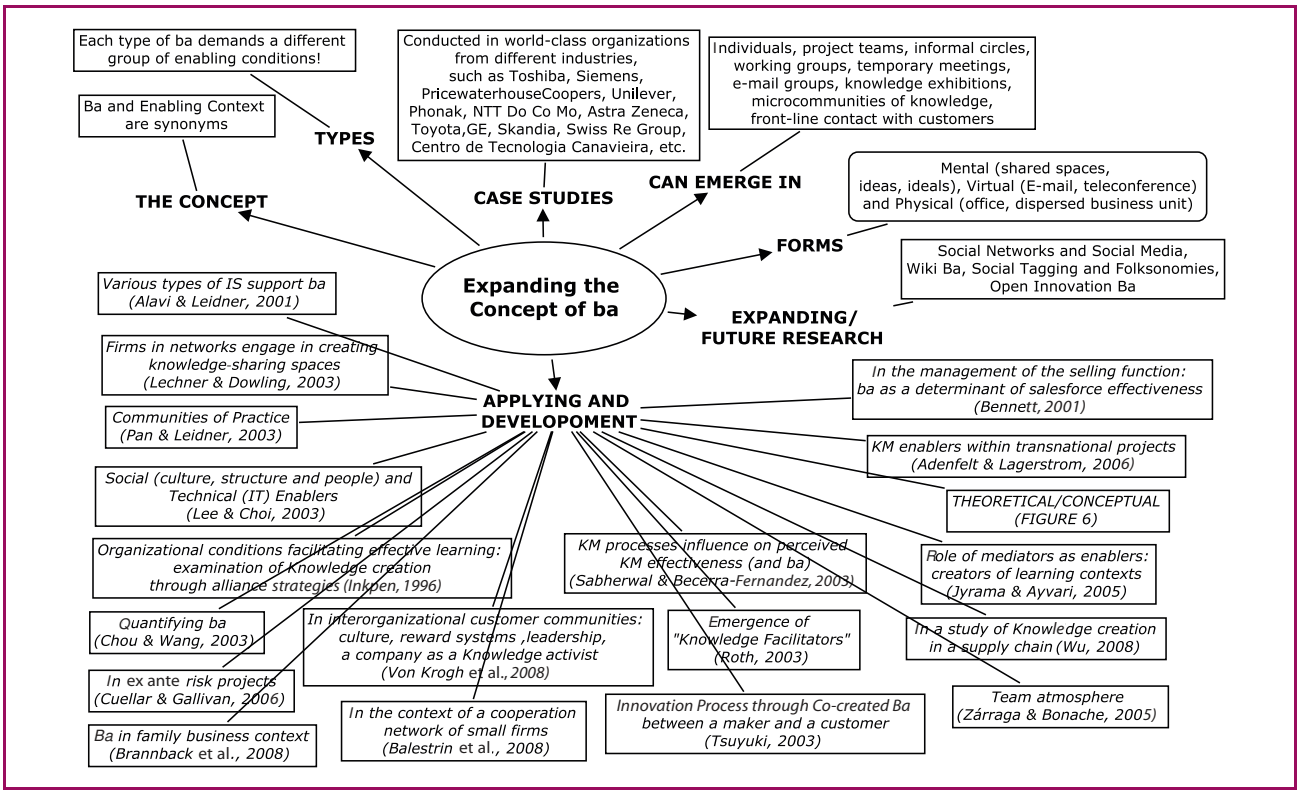
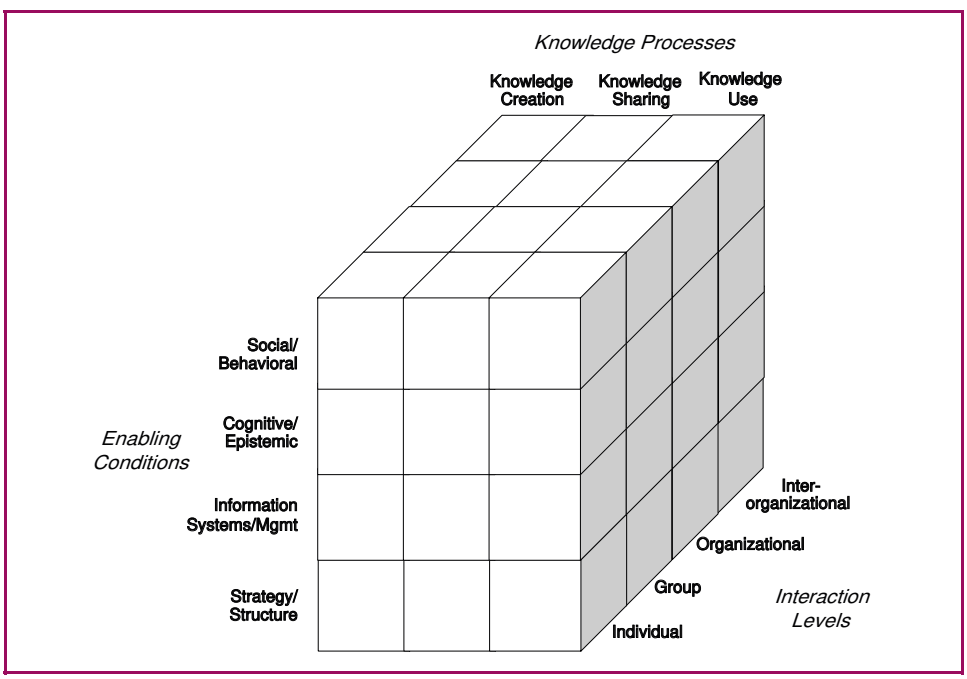


Figure 9 Framework for designing an enabling context in KM



> . . . it is the task of KM to work toward the management of the organizational context in the way that the accomplishment of the core KM activities are enabled . . . It is necessary to identify the context factors which are classified in the frameworks as particularly critical for the success of KM. The result of the study shows that among the central factors of KM; in particular critical factors are: human factors (culture, people and leadership), organizational aspects (structures and processes), information technology as well as a management processes (strategy and control). . . . The task of KM is to arrange these factors in such a manner that the KM activities can be achieved as smoothly as possible. Despite the fact that there is still not a standard way of characterizing influences on the conduct of KM, in this study, a widely shared understanding of the main categories affecting KM success has been observed (Heisig, 2009, p. 14).

5.1 Implications for research

Among the four sets of enabling conditions, there is a significant amount of research on strategy/structure, and on information systems/management. Much less attention has been given to the other two conditions. We need to better understand how social/behavioral conditions affect knowledge sharing and use. More empirical research is needed to examine the effect of group and social norms such as trust, reciprocity and cooperation on knowledge sharing behaviors. We also need more theoretical and empirical research on the cognitive/epistemic differences between organizations and how they influence knowledge management practices. For example, do different attitudes towards epistemic diversity and the need for a common cognitive framework lead to different approaches in managing knowledge? More generally, Nonaka and von Krogh (2009) have asked for further research and analysis that ''sheds light on the political and conflicting natures of learning, knowledge and social practice . . . Organization science will benefit from a realistic discussion of when social practices enable or stifle organizational knowledge creation and vice versa'' (p. 647) . . . They point out that: ''the [knowledge creation] process is 'fragile' and fraught with uncertainty, conflicts of interest, and differences in mindset'' (Nonaka and von Krogh, 2009, p. 640).

5.2 Implications for practice

The framework in Figure 9 suggests that designing an organizational environment for knowledge management requires a holistic approach, one that links the knowledge activities and the interactions to be supported to the enabling conditions we have identified. There are a number of tensions inherent in the framework which could present practical challenges. For example, the need for trust and personal relationships implied in the social/behavioral condition may be at odds with the need for formal coordination and discipline implied in the strategy/structure condition. Again, the call for diversity and openness in the cognitive/epistemic condition may run against the call for efficiency and standardization required in information systems/management. Recognizing these tensions and finding ways to navigate these potential areas of conflict would improve the probability of success in KM. Our reading of the literature suggests that managing knowledge is above all, a cultural and behavioral change process. To succeed in knowledge management is to succeed in instilling a set of values and a pattern of behaviors that enables people in the organization to use what they know to learn and innovate.

In conclusion, managing knowledge in organizations is fundamentally about creating an environment in the organization that is conducive to and encourages knowledge creation, sharing and use. Organizations pursuing knowledge creation and innovation may wish to be guided by the enabling conditions presented in this paper that have been discovered over ten years of research. These conditions and the frameworks they are part of can help managers to analyze, discuss, and introduce specific combinations of enabling factors that are tailored according to the type of knowledge process and level of interaction needed to address a particular knowledge problem or vision. From a research perspective, given its importance in organizational knowledge creation, and given its theoretical richness and adaptability, the construct of ba as enabling context remains both theoretically and empirically under-explored. We hope that this survey of the work that has been done so far will stimulate new thinking and research on this important topic.

References

Accorsi, F.L. and Costa, J.P. (2007), ''Peer-to-peer systems consubstantiate the ba concept'', in Remenyi, D. (Ed.), *8th European Conference on Knowledge Management*, Academic Conferences Ltd, Barcelona.

Adenfelt, M. and Lagerstrom, K. (2006), ''Enabling knowledge creation and sharing in transnational projects'', *International Journal of Project Management*, Vol. 24, pp. 191-8.

Alavi, M. and Leidner, D.E. (2001), ''Review: knowledge management and knowledge management systems: conceptual foundations and research issues'', *MIS Quarterly*, Vol. 25 No. 1, pp. 107-36.

Alvarenga Neto, R.C.D. (2005), ''Gestão do Conhecimento em Organizações: Proposta de Mapeamento Conceitual Integrativo ('Knowledge Management In Oganizations: An Integrative Conceptual Mapping Proposition')'', Tese (Doctoral Thesis), PhD Escola de Ciência da Informação, UFMG, Brazil.

Alvarenga Neto, R.C.D. (2007), ''Knowledge management in the Brazilian organizational context: a shift towards the concept of 'ba'', *Electronic Journal of Knowledge Management*, Vol. 5 No. 2, pp. 143-52.

Alvarenga Neto, R.C.D. (2008), *Gestão do Conhecimento em Organizações: Proposta de Mapeamento Conceitual Integrativo ('Knowledge Management in Oganizations: An Integrative Conceptual Mapping Proposition')*, Editora Saraiva (Saraiva Publishers), São Paulo.

Alvarenga Neto, R.C.D., Souza, R.R., Queiroz, J.G. and Chipp, H. (2009), ''Implementation of a knowledge management process within the Brazilian organizational context: the Ons (national operator of the interconnected power system) experience'', *6th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning, School of Information Studies, McGill University, Montreal, Canada, 1-2 October 2009*, Academic Conferences International, London.

Balestrin, A., Vargas, L.M. and Fayard, P. (2008), ''Knowledge creation in small-firm network'', *Journal of Knowledge Management*, Vol. 12 No. 2, pp. 94-106.

Baqir, M.N. and Kathawala, Y. (2004), ''Ba for knowledge cities: a futuristic technology model'', *Journal of Knowledge Management*, Vol. 8, pp. 83-95.

Bennett, R. (2001), '''Ba' as a determinant of salesforce effectiveness: an empirical assessment of the applicability of the Nonaka-Takeuchi model to the management of the selling function'', *Marketing Intelligence & Planning*, Vol. 19 No. 3, pp. 188-99.

Bosua, R. and Scheepers, R. (2007), ''Towards a model to explain knowledge sharing in complex organizational environments'', *Knowledge Management Research and Practice*, Vol. 5, pp. 93-109.

Brannback, M. (2003), ''R&D collaboration: role of ba in knowledge-creating networks'', *Knowledge Management Research and Practice*, Vol. 1, pp. 28-38.

Brannback, M., Carsrud, A. and Schulte, W.D. (2008), ''Exploring the role of ba in family business context'', *Vine: The journal of information and knowledge management systems*, Vol. 38, pp. 104-17.

Bryceson, K. (2007), ''The online learning environment – a new model using social constructivism and the concept of 'ba' as a theoretical framework'', *Learning Environ. Res.*, Vol. 10, pp. 189-206.

Burton, C.L. (2002), ''Knowledge transfer in a corporate setting: a case study'', PhD dissertation, School of Education, Indiana University, Bloomington, IN.

Cañas, A.J., Hill, G., Carff, R., Suri, N., Lott, J., Eskridge, T., Gómez, G., Arroyo, M. and Carvajal, R. (2004), ''CmapTools: a knowledge modeling and sharing environment, in concept maps: theory, methodology, technology'', in Cañas, A.J., Novak, J.D. and González, F.M. (Eds), *Proceedings of the 1st International Conference on Concept Mapping*, Universidad Pública de Navarra, Pamplona, pp. 125-33.

Chou, S.W. and Wang, S.J. (2003), ''Quantifying 'ba': an investigation of the variables that are pertinent to knowledge creation'', *Journal of Information Science*, Vol. 29 No. 3, pp. 167-80.

Corno, F., Reinmoeller, P. and Nonaka, I. (1999), ''Knowledge creation within industrial systems'', *Journal of Management and Governance*, Vol. 3, pp. 379-94.

Cuellar, M.J. and Gallivan, M.J. (2006), ''A framework for *ex ante* project risk assessment based on absorptive capacity'', *European Journal of Operational Research*, Vol. 173, pp. 1123-38.

Fayard, P. (2003), ''Strategic communities for knowledge creation: a western proposal for the Japanese concept of ba'', *Journal of Knowledge Management*, Vol. 7, pp. 25-31.

Ford, R. and Angermeier, I. (2004), ''Managing the knowledge environment: a case study from healthcare'', *Knowledge Management Research and Practice*, Vol. 2, pp. 137-46.

Gold, A.H., Malhotra, A. and Segars, A.H. (2001), ''Knowledge management: an organizational capabilities perspective'', *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 185-214.

Hansson, F. (2007), ''Science parks as knowledge organizations – the ''ba'' in action?'', *European Journal of Innovation Management*, Vol. 10, pp. 248-366.

Heisig, P. (2009), ''Harmonisation of knowledge management – comparing 160 KM frameworks around the globe'', *Journal of Knowledge Management*, Vol. 13 No. 4, pp. 4-31.

Inkpen, A.C. (1996), ''Creating knowledge through collaboration'', *California Management Review*, Vol. 39, p. 123.

Jackson, M.C. (2005), ''Reflections on knowledge management from a critical systems perspective'', *Knowledge Management Research and Practice*, Vol. 3, pp. 187-96.

Johnson, W.H.A. (2000), ''Technological innovation and knowledge creation: a study of the enabling conditions and processes of knowledge creation in collaborative R&D projects'', PhD Schulich School of Business, York University, Toronto.

Jyrama, A. and Ayvari, A. (2005), ''Fostering learning – the role of mediators'', *Knowledge Management Research and Practice*, Vol. 5, pp. 117-25.

Kodama, M. (2005), ''Knowledge creation through networked strategic communities – case studies on new product development in Japanese companies'', *Long Range Planning*, Vol. 38, pp. 27-49.

Koh, J. and Kim, Y.G. (2004), ''Knowledge sharing in virtual communities: an e-business perspective'', *Expert Systems with Applications*, Vol. 26, pp. 155-66.

Kostiainen, J. (2002), ''Learning and the 'ba' in the development network of an urban region'', *European Planning Studies*, Vol. 10, pp. 613-31.

Lechner, C. and Dowling, M. (2003), ''Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms'', *Entrepreneurship and Regional Development*, Vol. 15, pp. 1-26.

Lee, H. and Choi, B. (2003), ''Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination'', *Journal of Management Information Systems*, Vol. 20, pp. 179-228.

Miles, M. and Huberman, A. (1984), *Qualitative Data Analysis: A Sourcebook of New Methods*, Sage Publications, Newbury Park, CA.

Miles, R.E., Snow, C.C. and Miles, G. (2000), ''The future. org.'', *Long Range Planning*, Vol. 33, pp. 300-21.

Nakamori, Y. (2006), ''Designing, utilizing and evaluating 'technology-creating ba' in a Japanese scientific research institution'', *Systems Research and Behavioral Science*, Vol. 23, pp. 3-19.

Nishida, K. (1990), *An Inquiry into the Good*, Yale University, New Haven, CT (translated by M. Abe and C. Ives).

Nomura, T. (2002), ''Design of 'ba' for successful knowledge management – how enterprises should design the places of interaction to gain competitive advantage'', *Journal of Network and Computer Applications*, Vol. 25, pp. 263-78.

Nonaka, I. (1991), ''The knowledge-creating company'', *Harvard Business Review*, Vol. 69, pp. 96-104.

Nonaka, I. and Konno, N. (1998), ''The concept of 'ba': building a foundation for knowledge creation'', *California Management Review*, Vol. 40, pp. 40-54.

Nonaka, I. and Nishiguchi, T. (2001), *Knowledge Emergence: Social, Technical, and Evolutionary Dimensions of Knowledge Creation*, Oxford University Press, New York, NY.

Nonaka, I. and Toyama, R. (2002), ''A firm as a dialectical being: towards a dynamic theory of a firm'', *Industrial and Corporate Change*, Vol. 11 No. 5, pp. 995-1009.

Nonaka, I. and Toyama, R. (2003), ''The knowledge-creating theory revisited: knowledge creation as a synthesizing process'', *Knowledge Management Research and Practice*, Vol. 1, pp. 2-10.

Nonaka, I. and Toyama, R. (2007), ''Strategic management as distributed practical wisdom (phronesis)'', *Industrial and Corporate Change*, Vol. 16, pp. 371-94.

Nonaka, I. and von Krogh, G. (2009), ''Tacit knowledge and knowledge conversion: controversy and advancement in organizational knowledge creation theory'', *Organization Science*, Vol. 20 No. 3, pp. 635-52.

Nonaka, I., Reinmoeller, P. and Senoo, D. (1998), ''The 'art' of knowledge: systems to capitalize on market knowledge'', *European Management Journal*, Vol. 16, pp. 673-84.

Nonaka, I., Toyama, R. and Konno, N. (2000), ''SECI, ba and leadership: a unified model of dynamic knowledge creation'', *Long Range Planning*, Vol. 33, pp. 5-34.

Nonaka, I., Von Krogh, G. and Voelpel, S. (2006), ''Organizational knowledge creation theory: evolutionary paths and future advances'', *Organization Studies*, Vol. 27 No. 8, pp. 1179-208.

Pan, S.L. and Leidner, D.E. (2003), ''Bridging communities of practice with information technology in pursuit of global knowledge sharing'', *Journal of Strategic Information Systems*, Vol. 12, pp. 71-88.

Peltokorpi, V., Nonaka, I. and Kodama, M. (2007), ''NTT DoCoMo's launch of I-mode in the Japanese mobile phone market: a knowledge creation perspective'', *Journal of Management Studies*, Vol. 44 No. 1, pp. 50-72.

Pérez-Bustamante, G. (1999), ''Knowledge management in agile innovative organizations'', *Journal of Knowledge Management*, Vol. 3, pp. 6-17.

Ribeiro, R. and Collins, H. (2007), ''The bread-making machine: tacit knowledge and two types of action'', *Organization Studies*, Vol. 28 No. 9, pp. 1417-33.

Roth, J. (2003), ''Enabling knowledge creation: learning from an R&D organization'', *Journal of Knowledge Management*, Vol. 7, pp. 32-48.

Sabherwal, R. and Becerra-Fernandez, I. (2003), ''An empirical study of the effect of knowledge management processes at individual, group, and organizational levels'', *Decision Sciences*, Vol. 34, pp. 225-60.

Sawhney, M. and Prandelli, E. (2000), ''Communities of creation: managing distributed innovation in turbulent markets'', *California Management Review*, Vol. 42 No. 4, pp. 24-54.

Senoo, D., Magnier-Watanabe, R. and Salmador, M. (2007), ''Workplace reformation, active ba and knowledge creation: from a conceptual to a practical framework'', *European Journal of Innovation Management*, Vol. 10, pp. 296-315.

Seufert, A., Von Krogh, G. and Bach, A. (1999), ''Towards knowledge networking'', *Journal of Knowledge Management*, Vol. 3, pp. 180-90.

Seufert, S. (2000), ''Work-based learning and knowledge management: an integrated concept of organizational learning'', in Hansen, H.R., Bichler, M. and Mahrer, H. (Eds), *Proceedings of 8th European Conference on Information Systems, Vienna*, pp. 1413-20.

Shimizu, H. (1995), ''Ba-principle: new logic for the real-time emergence of information'', *Holonics*, Vol. 5 No. 1, pp. 67-79.

Tee, M.Y. (2005), ''Tacit knowledge in a e-learning environment: a naturalistic study'', PhD dissertation, University of Kansas, Lawrence, KS.

Tsuyuki, E. (2003), ''Ba and knowledge creation'', doctoral dissertation.

Von Krogh, G. (1998), ''Care in knowledge creation'', *California Management Review*, Vol. 40 No. 3, pp. 133-53.

Von Krogh, G., Ichijo, K. and Nonaka, I.O. (2000), *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*, Oxford University Press, Oxford.

Von Krogh, G., Kim, S. and Erden, Z. (2008), ''Fostering the knowledge-sharing behavior of customers in interorganizational healthcare communities'', in Cao, J., Li, M.L., Weng, C.L., Xiang, Y., Wang, X., Tang, H., Hong, F., Liu, H. and Wang, Y.L. (Eds), *IFIP International Conference on Network and Parallel Computing*, IEEE Computer Soc., Shanghai.

Von Krogh, G., Nonaka, I. and Ichijo, K. (1997), ''Develop knowledge activists!'', *European Management Journal*, Vol. 15 No. 5, pp. 475-83.

Wu, C. (2008), ''Knowledge creation in a supply chain'', *Supply Chain Management: An International Journal*, Vol. 13 No. 3, pp. 241-50.

Zárraga, C. and Bonache, J. (2005), ''The impact of team atmosphere on knowledge outcomes in self-managed teams'', *Organization Studies*, Vol. 26, pp. 661-81.

Zhu, Z. (2004), ''Knowledge management: towards a universal concept of cross-cultural contexts?'', *Knowledge Management Research and Practice*, Vol. 2, pp. 67-9.

Further reading

Alvarenga Neto, R.C.D. and Loureiro, R.S. (2008), in O'Sullivan, K. (Ed.), *Knowledge Management in the Brazilian Agribusiness Industry: A Case Study at CTC – Centro de Tecnologia Canavieira (Sugarcane Technology Center),* Academic Conferences Ltd, New York, NY.

Blackler, F. (1995), ''Knowledge, knowledge work and organizations: an overview and interpretation'', *Organization Studies*, Vol. 16, pp. 1021-46.

Boisot, M. (1998), *Knowledge Assets: Securing Competitive Advantage in the Information Economy*, Oxford University Press, New York, NY.

Choo, C.W. (1998), *The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions*, Oxford University Press, New York, NY.

Kodama, M. (2005), ''New knowledge creation through leadership-based strategic community – a case of new product development in IT and multimedia business fields'', *Technovation*, Vol. 25, pp. 895-908.

Maturana, H. and Varela, F. (1987), *The Tree of Knowledge*, New Science Library, Boston, MA.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Tsoukas, H. (2005), *Complex Knowledge: Studies in Organizational Epistemology*, Oxford University Press, New York, NY.

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