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Tacit knowledge: review and possible research directions

Krishna Venkitachalam and Peter Busch



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Abstract

Purpose – Tacit knowledge is often difficult to define, given its inexpressible characteristics. Literature review highlights the impact of tacit knowledge on certain knowledge management topics and these include organizational learning, intellectual capital, knowledge management strategy and so forth, but some research gaps remain. The paper aims to propose directions for future research in this domain of discourse.

Design/methodology/approach – A review of existing studies highlights some gaps in the literature on the role of tacit knowledge, which is followed by questions for future research.

Findings – Given the richness of tacit knowledge discourse, the authors believe that the proposed questions offer avenues for scholars to explore and develop greater understanding of the role of tacit know-how in certain knowledge management topics.

Research limitations/implications – The authors acknowledge that there are certain limitations to this paper, namely, focusing on the review of tacit knowledge and not on other forms of knowledge. The review presents the role of tacit knowledge and its use in the context of knowledge management related topics. Finally this study proposes only future research directions that are far from being exhaustive, rather than presenting field study results.

Originality/value – This paper reviews the existing literature on how tacit knowledge is perceived and used in certain knowledge management areas. Reviewing the current literature uncovers a number of gaps regarding the role of tacit knowledge.

Keywords Tacit knowledge, Implicit knowledge, Knowledge management, Research

Paper type General review

Introduction

In the current global landscape, change in organizations and their business environment often occurs at an increasing pace (Blackler, 1995; Ghemawat, 1991; Goh, 2005; Nonaka, 1991). Consequently, insights to manage uncertain economic conditions to create new knowledge perceptions and outcomes are evolving continuously across industries (Kim and Hwang, 1992; Nelson and Winter, 1982). The growing nature of unknown business environments often motivates the necessity for greater understanding of the role of tacit knowledge (Polanyi, 1962, 1967) and its dissemination both internal and external to the organization. One way of aspiring to understand tacit knowledge in organizations is from a process perspective that is concerned with accumulation of implicit knowledge acquired over time in organizational routines (Harlow, 2008; Johnson, 2007; Nonaka, 1994). However, attempting to appreciate tacit knowledge from such a viewpoint is obviously less than adequate for understanding all of the intangible dynamics in and around tacit knowledge creation, adoption and diffusion in organizations.

Fundamental to the in-depth exploration of tacit knowledge is the need for greater clarity of its significance and application in certain knowledge management domains. These include the impact of tacit know-how in strategic approach to organizational knowledge; the role of tacit knowledge in organizational learning; tacit knowledge transfer via narration and

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story-telling; the influence of tacit knowledge in intellectual capital; its use in communities of practice, teams and knowledge networks, and finally tacit knowledge relevance in information technology of organizations (Alavi and Leidner, 2001; Boland and Tenkasi, 1995; Bontis, 1998; Bush and Tiwana, 2005; Crossan *et al.*, 1999; Hansen *et al.*, 1999; Snowden, 2002; Sveiby, 1997; Tsui, 2005). It is also widely recognized that tacit knowledge is clearly contextual (Busch, 2008) and that the interpretation of it along with its transfer requires multiple stakeholders. Hence, merely discussing tacit knowledge is not only unremarkable but also trite; what is less encountered and more desirable in the scholarship discourse is examining how tacit knowledge may be better made use of. To that end, the authors aim to provide some useful research directions in this paper.

The existing literature provides sufficient evidence to support the importance of tacit knowledge and many studies have been conducted in this regard. However, there is lacuna in the literature which will be uncovered through an extensive review in the following sections including how tacit knowledge is perceived in the literature and what its relevance is in multiple domains of knowledge management such as knowledge management strategy, organizational learning, storytelling, intellectual capital, communities of practice, knowledge networks, information and communication technology (ICT). Following on, the authors argue there is a significant gap with regards to the study of tacit knowledge in these domains and a number of pertinent questions are presented for future research inquiry into the understanding and role of tacit knowledge phenomenon.

Role of tacit knowledge in knowledge management

Kakabadse *et al.* (2001) note that some postmodernists argue there is no universal foundation for knowledge, rather just the consensus of the community; nevertheless there is at least a widely held view of the “knowledge hierarchy” in as much as datum are generally viewed as un-interpreted raw facts. When data collectively is organized in some way, it becomes information. Knowledge in turn is information that has human meaning attached to it (Bhatt, 2001) or has been ascertained from information through tests of proof (Lee and Bai, 2003). Eventually one could consider wisdom as encompassing judicious interpretation and application of knowledge (Sternberg, 2000). The continuum of knowledge discussed so far represents just one dimension of relevance to knowledge management (KM). Given the focus of the paper, the authors have moved away from this relevant and continued debate on knowledge hierarchy.

Another interpretation relates to knowledge existing at the level of the individual versus the organization (Merx-Chermin and Nijhof, 2005; Sveiby, 1997; Nonaka, 1991). Individual knowledge mainly includes tacit knowledge that is not typically articulated but may be codified depending upon the circumstances. Organizational knowledge on the other hand usually incorporates greater proportions of explicit knowledge. For example, Bossen and Dalsgaard (2005) regard procedural knowledge as being equivalent to tacit knowledge, whilst others (Colonia-Willner, 2004; Sternberg and Hedlund, 2002) view tacit knowledge as being procedural knowledge of relevance to daily life. Such knowledge may be used for daily activities and is of relevance to the person making use of it, and may be employed in stratagems to actualize or make actionable, the knowledge in question. In turn, this type of procedural knowledge becomes a form of practical intelligence to the organization (Sternberg *et al.*, 1995).

Organizational knowledge is very much at the core of knowledge management, and some would argue this consists of the management of knowledge about the company, its operations, competitors, customers and supply chain (Siemieniuch and Sinclair, 2004). Predictably, scholars are usually of the opinion organizational knowledge is both tacit and explicit (Guzman and Wilson, 2005); and furthermore developed from that which resides in the employee’s minds and in their interactions in their place of work (Hustad, 2004). As a result organizational knowledge is moderately automatic; meaning employees are somewhat aware of it, yet at the same time, apply the knowledge without adequate reflection to its existence. It is communal in as much as it comprises the knowledge of a number of staff, not just that of the chief executive officer (CEO) or chief knowledge officer

(CKO). What is more is that it is obviously evolving over time as opposed to representing a summary of a firm's knowledge. Organizational knowledge like its tacit counterpart is also contextual in that it is typically tied to a firm's context but this does not imply that it is not transferable (Guzman and Wilson, 2005).

Arguably, the major constituent of organizational knowledge is the contribution of its staff, for individuals are not silos of knowledge, rather their connectivity to other staff constitutes a considerable component of organizational know-how, in so far as "the whole is greater than the sum of its parts". A considerable driver for the recognition of organizational knowledge has been the increasing migration in the workplace from manufacturing to more service based industries. This is especially the case in most of the developed markets that are concurrently evolving from the Taylorist model of specialized work processes (Taylor, 1911) to the workplace of the present-day where individuals seek an increased sense of purpose and belonging with work practices relying on intellectual cooperation between employees with at least a half-open recognition to "human capital" (Jorgensen, 2004). As a consequence, there is inundated expansion of market, customer, supplier, competitor, and employee know-how across different industries and regions globally (Goh, 2005); and organizations have started to recognize the importance to develop suitable strategic approaches to manage knowledge effectively.

Strategic approach to knowledge

Ezinegeard *et al.* (2000) examined professional service organizations and concluded these businesses were people driven and often dependent on the know-how and skills of the employees to deliver services. In such businesses, they argue that the sharing and use of individual tacit knowledge across the organization is required to deliver strategic performance. Hence tacit knowledge, its transfer and use are one of the elements that need to be focused by organizations. Johnson (2007) emphasizes tacit-knowing as a means by which the individual creates and shares know-how to generate organizational knowledge. He also argues tacit knowing is a result of patterns that are given recognition over a period of time suggesting that the existence of trust between team members contributes to the shared experience there by increasing team performance. Other studies such as Hahn and Subramani (2000) argue that organizations often face challenges in linking knowledge management strategy to practice; in particular there exists a lack of clear understanding with respect to the association between knowledge management and strategy. They see this as a critical gap in the literature and propose a framework to direct and locate organizational knowledge through different levels of support by using knowledge management systems.

Notwithstanding the studies linking knowledge management systems and tacit knowing and how it can contribute to firms' strategic performance, Hansen *et al.* (1999) studied a number of organizations and found managers select distinctive strategies to manage knowledge, namely codification and personalization. Codification strategy focuses on IT where knowledge is codified and stored in databases for easy access and reuse. Personalization strategy centers on people and is shared between employees where IT aids communication of individual tacit knowledge instead of storing it in repositories (Hansen *et al.*, 1999). They have argued that the challenge for organizations is to decide between codification and personalization focus; and such a decision will depend on the way the organization provides products and services to their clientele, the economics of the business and the staff it hires. Hansen *et al.* (1999) suggest that organizations focus on standardized products or services; adopt a codification strategy that reuses explicit knowledge as necessary, whereas for customized products and services, personalization is considered useful where the transfer of individual tacit knowledge is believed to be important, despite some criticisms regarding this strategic approach.

Studies (Jasimuddin *et al.*, 2005; Scheepers *et al.*, 2004) have critiqued and argued that personalization and codification strategies should be unified to realize the benefit of tacit and explicit knowledge. Jasimuddin *et al.* (2005) for example, contend organizations involved in knowledge management should adopt a symbiotic approach to knowledge management strategy; creating contexts for easy replication of knowledge internally

whereas externally competitors will find difficulties in copying the organizational know-how that is often unique and tacit. Desouza and Evaristo (2004) proposed a project-focused perspective. They suggest that every project provides insight, which consists of individual project knowledge covering schedules, timelines, meeting summaries, and training documents. They further draw a link between types of computing and knowledge management strategy approaches. They conclude that organizations dependent on client-server computing are generally centralized and are closely tied to codification strategy; while organizations focused on distributed peer-to-peer computing are considered to be associated with personalization strategy.

Despite distinctions in approaches to knowledge management strategy in the existing literature, it is often worthwhile to recognize the relationship that exists between tacit knowledge and explicit knowledge. In this regard, Smith (2001) suggests, "comparing tacit and explicit types of knowledge is a way to think and not point out differences". This means that explicit knowledge signifies the "process" that deals with how knowledge is organized, whereas tacit knowledge represents "practice" that refers to how work is done (Smith, 2001). Additionally, Brown and Duguid (2000) have pointed that tacit knowledge helps in organizational innovation resulting in knowledge creation whereas explicit knowledge provides a predictable environment and guidance to know-how of work tasks performed. Ashkenas *et al.* (1998) noted that people like to share tacit knowledge in classifying intellectual assets innovatively when compared to physical assets.

Certainly a number of studies have suggested that the use of tacit knowledge in an organization can contribute to strategic benefits in the form of business innovation, financial growth and industry performance (Harlow, 2008; Teerajetgul and Chareonngam, 2008; Moungnos and Charoenngam, 2003; Kim and Hwang, 1992; Hennert, 1991). Harlow (2008) for example, developed a measure called tacit knowledge index (TKI), which is useful to measure an organizations' ability to create and sustain core competence in KM. A related study by Somech and Bogler (1999) measured individual capability in the creation of tacit knowledge. Hennert (1991) and Kim and Hwang (1992) also conducted studies measuring tacit knowledge by proxy methods such as financial and human resource data on the penetration of new markets by organizations in Japan and the US.

Strategically, Pathirage *et al.* (2007) considered the importance of tacit knowledge in realizing specific industry benefits; for example, due to the labor intensive nature, the construction industry is often dependent on prior individual knowledge to determine future business solutions. Nonetheless, Kamara *et al.* (2003) argue that construction professionals such as engineers and architects consider transferring certain types of tacit know-how such as "best practices" from past projects as complex. Pathirage *et al.* (2007) and many other studies (Teerajetgul and Chareonngam, 2008; Moungnos and Charoenngam, 2003; Sauer *et al.*, 2001; Lynn *et al.*, 2000; Oglesby *et al.*, 1989) have suggested that the construction industry is competitive and believe a people driven approach is critical in this sector which also typifies how organizations can "learn". In this regard, Dolog's *et al.* (2008) argued for a personalization strategy approach to learning. They developed a framework that explained the concept of a smart space for a learning infrastructure that in turn focused on enabling individual learning networks as a shared space of interconnected knowledge repositories, which raises discussion about what is the link between organizational learning and the relevance of tacit knowledge in learning.

Organizational learning

To understand and analyze the use of tacit knowing in the context of organizational learning, Johnson (2007) suggests a model that explains the mechanisms of learning in organizations. In other words, the individual approach to learning through pattern recognition and synthesis supports macro level processes of interpreting, intuiting, integrating and institutionalizing first suggested by Crossan *et al.* (1999). Recognizing patterns by filtering out irrelevant ones (that are determined through purposeful exploration (March, 1991)) as well as synthesizing new patterns are then communicated to other staff in the organization, which informs organizational learning and knowledge creation.

This re-iterative synthesis provides a deeper explanation of absorptive capacity rules and the organizational ability to recognize the value of new external tacit know-how of different individual contexts (e.g. customers, suppliers, competitors, strategic alliance partners, joint ventures and so forth) and its incorporation that is “largely a function of the firm’s level of prior related knowledge” (Cohen and Levinthal, 1990, p. 128).

Szulanski’s (1996) work on tacit knowledge in organizational learning argued that transferring best practices inter-firm is important to the firm’s learning and competitive advantage. He claims that just as a firm’s distinctive competencies become difficult to be replicated externally by other firms, “best practices” are also difficult to replicate internally across divisions. He proposed four stages of intra-firm knowledge transfer namely initiation, implementation, ramp-up and integration. The first and second stages involve all actions that are taken to transfer the tacit know-how within the organization. Ramp-up and integration start when the receiver uses the transferred knowledge in the organization (Szulanski, 1996). Arguably, another approach to transferring tacit knowledge in intra-firm contexts is that of narration and its variants.

Narration and storytelling

Narration is often considered as a useful insight to tacit knowledge. Linde (2001, p. 161) defines narrative as a form of individual tacit knowledge where “language is perhaps the most tacit form of tacit knowledge: one knows how to speak but cannot articulate how one does it, or the rules which govern language its use. Part of the knowledge of language includes knowledge of discourse forms: how and when to tell a story. Knowledge about identity, who one is and what one’s history has been is a very important part of an individual’s tacit knowledge”. Linde’s (2001) study focused on oral stories (a form of narrative) and is often considered essential in every institution (from formal to informal organizations). In this regard, Labov (1972) had argued that the most effective oral stories were those in which the evaluation was the least explicit. While Mulder and Whiteley (2007) suggested tacit knowledge could be captured as narrative within three settings; the teleological motive which determine the purpose of capture, the bounded environment where the business operates to support corporate objectives and lastly its drivers and controlled vocabulary that is familiar to respondents in their business context.

In contrast, Giddens (1984) observed that sometimes activities in an individuals’ work context are already known even if the individuals are not consciously aware of it. Most famously Polanyi (1967, 1962) had argued that every individual knows more than he/she knows that they know. He further referred to “tacit knowing” as the prerequisite of explicit knowing and that there is no clear existence of distinction between tacit and explicit knowledge. He states, “Tacit thought forms an indispensable part of all knowledge”. Even if knowledge has been articulated into words or mathematical formulas, this so-called explicit knowledge must rely on being tacitly understood and applied. Hence, he emphasized, “all knowledge is either tacit or rooted in tacit knowledge”. A wholly explicit knowledge, he argues, is unthinkable.

The philosophical underpinnings of a pure tacit knowledge study is therefore not clearly in place yet (Polanyi, 1967, 1962). Mackay (1974, p. 94) has argued that “the ‘tacit’ aspect of knowledge as Polanyi himself has pointed out, is what we have in common with lower animals, presumably all of their ‘knowing’ is tacit. Therefore, we much distinguish between what we can say we know, and what a suitably equipped observer could say we know; between what we cannot put into words, and what cannot be put into words. It is scientifically inappropriate to regard knowledge that we can express in words as paradigmatic, and tacit knowledge as a peculiar special case. What we need from the outset is a methodology that can cope with tacit knowledge, taking verbalisable knowledge as a special case. The fact that digital computer programs are necessarily explicit and discrete does not rule out the possibility of digitally modeling the processes underlying tacit knowing; but it does constitute a temptation to take introspectively verbalisable data as the starting point for model making, which can be a methodological trap.”

Additionally, Smith (2001, p. 313) argues “people possess slightly different types of tacit and explicit knowledge and apply their knowledge in unique ways, and that individuals use different perspectives to think about problems and devise solutions”. Reber and Lewis (1977, p. 358) have argued (e.g. other studies as well such as Collins, 2010; Tsoukas, 2005; Turvey, 1974) “that the operating of making tacit knowledge explicit, the act of giving it verbal form is essentially a constructivist exercise wherein the deep abstract knowledge is mapped through a linguistic output system”. The relationship between tacit knowledge and explication of it by its possessor is likely to be understood only when both forms model the underlying abstract representation and characterize the manner in which such representations are mapped through verbalization.

Apart from these different views and representations of understanding tacit knowledge, another way to explicate tacit knowledge is storytelling (Bhardwaj and Monin, 2006; Küpers, 2005; Snowden, 2005; Snowden, 2002) or narrative knowing. Storytelling is an approach pertaining to managing or at least appreciating the knowledge existing within firms (Roth, 2003); allowing individuals to explicate thoughts, use metaphors and convey body language concurrently. The combination of such approaches is far more information-rich than a message sent through e-mail. In brief, stories permit embodied “emotional knowledge” and the transfer of “meta knowledge” (Küpers, 2005). Other studies such as Eden and Spender (1998) have also suggested tacit knowledge consists of a set of ingredients in an individual’s head which are a range of experiences, education, technical know-how and cultural values; collectively such parameters can be considered to be the intellectual capital of an organization.

Intellectual capital

One of the pillars in past decades of KM related research has been the concept of intellectual capital, first espoused by John Kenneth Galbraith in 1969 (as cited in Feiwal, 1975); it is a form of true hidden value in intangible resources (Mouritsen and Larsen, 2005) but is most relevant in the context of sharing and the creation of tacit knowledge. Siblings of intellectual capital include: social (Smedlund, 2008), human, structural and customer capital (Bontis, 1998).

Human capital is considered by Hudson (1993) at a granular level to comprise the genetic inheritance, education, experience and attitudes about life and business in general, such that these attributes exist independent of social relationships. In essence, the attributes that Hudson (1993) refers to overlap with the concept of individual tacit knowledge as espoused by Nelson and Winter (1982, p. 82). They noted that the reason for individual knowledge remaining in a tacit state might be due to cost, for “whether a particular bit of knowledge is in principle articulable or necessarily tacit is not the relevant question in most behavioral situations. Rather, the question is whether the costs associated with the obstacles to articulation are sufficiently high so that the knowledge in fact remains tacit”. While Structural capital relates to the relationships between individuals, customer capital is knowledge embodied in the product or service requirements clientele expect of a company (Bontis, 1998).

One way of examining the relevance of and existence of tacit knowledge in the context of different forms of intellectual capital is that of actor network theory (ANT) which acknowledges the independent nature of such knowledge existing in its own right (Kaghan and Bowker, 2001). Nevertheless, when recognizing the very contextual nature of tacit knowledge, it makes little sense to attribute properties to knowledge that does not exist outside human consciousness. Conversely when discussing articulable tacit knowledge, that is to say tacit knowledge that is not truly tacit but able to be codified in some form, ANT may be of some relevance (Kaghan and Bowker, 2001).

Another theoretical link relevant to the tacit knowledge discourse is the concept of distributed cognition (Shariq, 1999; Hutchins and Hazlehurst, 1995). Established in the field of psychology, distributed cognition relates to representations of information both within and of themselves as well as the transformation of information across to the receiver. Its relevance to tacit knowledge is the acknowledgement given by distributed cognition to

shared meaning existing amongst people in professions or communities of practice (Håkanson, 2007). What does differentiate distributed cognition from the general theory surrounding tacit knowledge is its focus on “boundary objects” or “off-loading”, that is to say the use of some physical medium, paper, pens and calculators to store other tacit knowledge temporarily (Håkanson, 2007). The importance of context to the use of knowledge is emphasized in both distributed cognition and tacit knowledge (Håkanson, 2007; Shariq, 1999). The next section reviews the role of tacit knowledge in the context of teams, communities and networks.

Communities of practice, teams and knowledge networks

The role of teams in the modern organization and their connection with managing tacit knowledge is clearly of importance (Jorgensen, 2004); for instance cliques working on an assignment need to pool resources and share their knowledge. The composition of the team will also have an impact on the likelihood of tacit knowledge exchange, for disparate teams can negatively influence the transfer of knowledge, as “people tend to feel part of a social group . . . to which they assign superior or at least more positive characteristics, skills and knowledge with a tendency to assign negative characteristics to other groups” Camelo-Ordaz *et al.* (2005, p. 698). Though such negativity may be true at the inter-team level (Bush and Tiwana, 2005), at the intra-team level, others (Malik, 2004) claim heterogeneity along the lines of intellectual and occupational background may in fact increase knowledge creation and transfer in novel ways. What is clear is that if the knowledge is not readily available within the group, then it must be introduced from without; likewise should a colleague leave the team, he or she will take their tacit knowledge with them, a process analogous to socialization (e.g. SECI model of Nonaka (1994)) or horizontal knowledge transfer (Walczak, 2005).

It is not irrational to consider communities as teams on a larger scale. The community of practice (CoP) model (Lave and Wenger, 1991) with its foundations in the apprenticeship system is well cited in the existing literature. For example, Hustad (2004) remarks the CoP model has a number of variants, including communities of knowing (from Boland and Tenkasi, 1995), communities of practitioners (from Blackler, 1995) and micro-communities of knowledge (from von Krogh *et al.*, 2000). The inspiration behind such communities is that they seek to provide personalized tacit knowledge exchange. The John Deere tractor-manufacturing firm is one such example that “recognises” hundreds of CoPs for enabling tacit knowledge exchange. The CoP system specifically within the John Deere firm is referred to as MindShare, in which videoconference, e-mail and discussion groups are fully incorporated (Desouza and Evaristo, 2004).

Another widely examined tacit knowledge associated phenomenon in team environments is that of knowledge networks. Knowledge but particularly tacit knowledge, is sticky by nature (Bush and Tiwana, 2005; Jensen, 1993; Szulanski, 2003; Ramaprasad and Rai, 1996; Hoskisson and Hitt, 1994; Ghemawat, 1991; Dosi, 1988; Polanyi, 1967). In this regard, Sternberg *et al.* (1995) claim the more valuable the tacit know-how, the less likely the individual, team or organization will want to lose it or transfer it out. Studies indicate that sharing of knowledge and particularly tacit knowledge causes the team or individual to become less important to the organization (Desouza and Evaristo, 2004). Additionally, the more that is invested in building up a knowledge network, the less likely the abandonment of this precious resource will be contemplated (Bush and Tiwana, 2005). Moreover, the composition of the network is also of direct relevance to the “stickiness” of knowledge.

Snowden (2005) argues that informal self-formed networks inherently carry more trust than any formal network established by senior management in an organization. Employees who form their own teams are more likely to be successful at sharing their experiences, and significantly, staff that is recipient of important knowledge will gain from the experiences of their more knowledgeable peers. Perhaps the greater the distance between the sender and receiver of the tacit knowledge, the more difficult and less reliable will be the transferal process (Foos *et al.*, 2006; Szulanski, 2003). Guzman and Wilson (2005) contend that

knowledge transfer takes place along Nonaka's (1994) lines of socialization, externalization, combination and internalization (SECI).

Socialization involves the transfer of tacit knowledge between personnel. Externalization is concerned with explicating ones' tacit knowledge. Combination entails blending explicit and tacit knowledge and finally internalization is the process of taking codified knowledge and making sense of it as individuals. There are a number of other individual parameters that influence tacit knowledge transfer. One is the establishment and maintenance of good relationships between the sender and receiver of the knowledge (Seidler-de Alwis and Hartmann, 2008; Foos *et al.*, 2006; Hansen, 1999; Krackhardt and Hanson, 1997). Another is that of self-efficacy, or the ability of the individual to believe that they are capable of something, in this case knowledge transfer (Endres *et al.*, 2007). Other individual parameters are perception and language competency; time that transfer takes place; perceived value and ownership of the knowledge in question; and distance of tacit knowledge transfer between sender and receiver (Selamat and Choudrie, 2004; Jacob and Ebrahimpur, 2001; Haldin-Herrgard, 2000). The aforementioned parameters pertaining to tacit knowledge transfer can often be effectuated through ICT.

Information and communication technology (ICT)

The role that ICT plays in the tacit knowledge transfer process encompasses differing perspectives. As early as 1980s, the focus had been on IT as a savior for knowledge creation (Goh, 2005). One such example are expert systems, however these too have had criticisms from a KM point of view as "developers have focused too much, perhaps overly so, on developing 'thinking machines' using, for instance, artificial intelligence (AI) techniques, rather than designing these 'machines' to augment 'human thinking'" (Goh, 2005, p. 8). Hansen *et al.* (1999) also remark that ICT can have a disruptive effect with regard to exchanging tacit knowledge; as ICT often means that employees may email rather than conduct a face-to-face meeting with a colleague.

Conversely, some studies argue that ICT can have a positive impact (Goh, 2005; Tsui, 2005; Hustad, 2004; Syed-Ikhsan and Rowland, 2004; Roth, 2003; Daft and Lengel, 1986), although there is a general consensus that machines process information, whilst knowledge must be processed by humans (Albino *et al.*, 2004), for "knowledge as the object of knowledge management is not necessarily the same as knowledge as stored in a knowledge-based system" Ng and Li (2003, p. 170). Technology innately decreases distance, increases the speed of transfer and provides a means of conformity (Albino *et al.*, 2004). However, one study suggests that "ICT fits in better with a knowledge management strategy aimed at codification, i.e. storing descriptive amounts of tacit knowledge for the purpose of reusability" Ng and Li (2003, p. 169).

Accepting that a component of tacit knowledge could be codified, one way of storing such knowledge would be through knowledge repositories (Bush and Tiwana, 2005) such as Lotus Notes databases or similar systems, where staff are persuaded to enter their workplace "street smarts". If an employee should know a particular way of solving a problem, they are able to enter this tacit know-how into a knowledge base and "even knowledge that cannot be codified or stored in a knowledge repository can be shared through hyperlinks, pointers and multimedia" Bush and Tiwana (2005, p. 70).

Depending on the nature of the firm, staff will be expected to enter their articulable tacit knowledge as a means of changing from a knowledge hoarding to a knowledge sharing culture (Harrington, 2005). Buckman Laboratories, with its head office in Memphis, Tennessee, but with offices around the world, provides a good example of this: "Buckman Labs has organized its employees and their work around its knowledge network – K'Netix". Not long after K'Netix went online, Buckman made his expectations clear: "Those of you who have something intelligent to say now have a forum in which to say it. Those of you who will not or cannot contribute also become obvious. If you are not willing to contribute or participate, then you should understand that the many opportunities offered to you in the past will no longer be available" (Robbins *et al.*, 2003, pp. 298-299). Such dedication comes

at a price, for Buckman Laboratories spend \$7,500 per employee each year (as of 2003) to facilitate such knowledge networking (Kankanhalli *et al.*, 2003).

In summary, existing studies on tacit knowledge in certain topics of knowledge management literature reviewed in this study is predominantly descriptive. A limited number of empirical studies in the literature examine the origin and meaning of tacit knowledge in the context of individuals, yet even fewer studies exist examining the flow of such knowledge between people. Based on a wide-ranging review of the literature presented in this section, the authors identify the following research issues that require further inquiries in the role of tacit knowledge in knowledge management discourse; and as such in the next section propose a number of questions (i.e. possible research directions) in the study of tacit knowledge.

Research directions in tacit knowledge

Beginning with the philosophical underpinnings of tacit knowledge, as reviewed earlier there are many studies that examined the meaning and definition of tacit knowledge and very few studies have investigated analyzing tacit knowledge. Fundamentally, the question of whether tacit knowledge may be codified is one that distinctly requires further clarification. In the current literature with reference to “knowledge”, scholars have defined different types of knowledge such as procedural and declarative to name a few; so the critical inquiry to undertake is on the categories of “tacit knowledge” and the potential areas to explore are:

- RQ1. If tacit knowledge can be articulated, how often can such knowledge still be considered as “tacit”?
- RQ2. Do different types of tacit knowledge exist?
- RQ3. To what extent can tacit knowledge be articulated?

There is much research in the knowledge management literature discussing strategic approaches to knowledge; these comprise models, theories and frameworks on knowledge management strategies. Especially in the context of the strategic management of tacit knowledge, there is very limited evidence in the literature; one such study by Hansen *et al.* (1999) introduces the concept of personalization focused on strategically managing the knowledge of individual employees collectively. This approach was fundamentally developed from studies primarily based in the services sector; however the applicability of this strategic dimension in other sectors/businesses/departments/teams needs further examination. Therefore the key question/s to investigate are:

- RQ4. What implications does personalization knowledge management strategy have for specific segments of products, business and/or industry?
- RQ5. How does personalization knowledge management strategy influence cultural openness towards tacit knowledge exchange in organizations?

As reviewed earlier, studies indicate that organizational learning is an essential component in the sustenance of a firm’s competitive advantage in the marketplace. One of the ways organizations learn from their past is through their employee skills and know-how (Reber, 1989; Reber and Lewis, 1977). Organizations have recognized the need for investment in developing employee capabilities as part of their work environment; however the influence of employee profile in the use of tacit knowledge is not adequately evident in the literature. On the above basis, the following research questions can be considered to drive further research in this area:

- RQ6. How does tacit know-how of staff account for an organization’s learning capability?
- RQ7. How important is the use of tacit knowledge more critical to certain organizational roles than others? If so, why?
- RQ8. How are employee attributes (e.g. age, gender, ethnicity, seniority, educational background, experience) a determinant in their use of tacit knowledge?

Arguably, one of the main thrusts of KM is improving the flows of tacit know-how within the organizational context. There is strong evidence in the literature regarding knowledge transfer between divisions as well as bodies external to the organization. The composition of staff is also noted to have an effect on the likelihood of tacit knowledge transfer (Busch, 2008; Hansen, 1999); conversely will the flow of tacit knowledge actually improve the employee skill base? For the aforementioned rationale, the following research questions can be examined:

RQ9. What are the relationships between organizational context dependent factors (e.g. values, mission, vision, culture, strategy, structure, employee profile and infrastructure) and the flow of tacit knowledge?

RQ10. What are the organizational benefits realized in the transfer of tacit knowledge?

Typically in industrialized economies, firms have evolved from a manufacturing environment to service based businesses. Besides the obvious competitive advantages gained through lower labor costs for manufacturing offshore, one other reason for the service orientation is due to the increasing importance acknowledged toward individual competencies, know-how and collectively the intellectual capacity of the organization. Intellectual capital comprising not only employee, but also structural, customer and supplier know-how provides a central underpinning to organizational knowledge. In this regard, organizations struggle to quantify the tacit know-how of individual stakeholders; which in turn presents challenges, as such the following research questions present an opportunity to explore:

RQ11. How does an organization's intellectual capital shape the creation of tacit knowledge?

RQ12. How do structural, social, supplier and customer capital deliver value to a firm's intellectual capacity?

Organizations recognize the importance of teams, networks and communities in the workplace. Narration and storytelling are useful mechanisms by which tacit know-how is transferred between individuals and in teams collectively. Equally, tacit knowledge will enrich the storytelling process. What remains unanswered is the extent to which the phenomenon of tacit knowledge residing in team environments and narrative knowing influence one another, hence the following questions are considered to be relevant to explore:

RQ13. How does the composition of a team in the workplace influence the transfer of tacit knowledge?

RQ14. How are narrative and storytelling mechanisms effective in tacit knowledge transfer for maintaining teams and/or communities of practice?

Perhaps one of the most interesting unexplored research issues with regard to tacit knowledge creation and particularly transferal is the impact ICT has in the organization (Goh, 2005). Advocates and critics suggest the influence of information technology in the KM domain support codified knowledge rather tacit knowledge. Yet, there is evidence in the current literature that presents the use of technologies and applications to support the articulation and flow of tacit knowledge between individuals; therefore the following question could be useful to examine:

RQ15. How is the storage of descriptive tacit knowledge through ICT significant to the process of knowledge codification?

In summary, consideration of the above research questions in future studies can advance the understanding and conceptual clarity that is presently less evident in the literature of tacit knowledge in certain knowledge management areas.

Conclusion

This paper has reviewed the existing literature on the role of tacit knowledge. The authors have highlighted how tacit knowledge is perceived and used in some knowledge management topics such as strategic approach to knowledge, organizational learning, storytelling, communities of practice, intellectual capital, knowledge networks and so forth. In reviewing the extant literature, the paper uncovers a number of possible directions for research in the domain of tacit knowledge. The authors articulate that these directions are pertinent to the relevance of tacit knowledge in different areas of the knowledge management domain. In keeping with this direction, the authors also argue the need for future studies examining the philosophical underpinnings to tacit knowledge. Following on research questions are suggested in the areas of strategic dimension of tacit knowledge; the role of tacit knowledge in organizational learning; the organizational benefits to tacit knowledge transfer; the influence of tacit knowledge in intellectual capital; the transfer of tacit know-how and its use in communities of practice; and the role of information communication technology with regard to tacit knowledge.

The authors acknowledge that there are certain limitations to the paper, beginning with exclusively restricting to the examination of the existing literature on tacit knowledge and not on other forms of knowledge. Furthermore, despite the fact that this paper assessed certain areas in knowledge management such as organizational learning, intellectual capital, communities of practice and so forth, the authors have only reviewed the role of tacit knowledge specifically in such contexts. Finally, the paper proposes only future research directions here, rather than providing research (or empirical study) results per se and these possible research inquiries are not exhaustive in nature.

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