

THE ROAD LESS TRAVELLED: A NEW PERSPECTIVE ON SUSTAINED COMPETITIVE ADVANTAGE THROUGH KNOWLEDGE CREATION

Abstract

Knowledge and intellectual capital have become the primary bases upon which organisations construct their core competencies and are increasingly seen as the key to superior organisational performance (Lubit, 2001). At the same time, both the need to and difficulty associated with developing sustainable competitive advantages are rapidly increasing (ibid.). This paper argues that two roads lead to sustained competitive advantage in firms. The well-travelled road is largely based on conceptualising knowledge in terms of information and data and attempting to leverage organisational knowledge by focusing on the management and utilisation of information in organisations. The road less travelled is based on recognising the power of knowledge in general, and knowledge creation in particular, to stimulate creativity and innovation in organisations leading to sustained competitive advantage. On this road, it is recognised that truly innovative organisations “do not simply process information... they actually create new knowledge and information, from the inside out, in order to redefine both problems and solutions and, in the process, to re-create the environment” (Nonaka and Takeuchi, 1995, p.56). Despite the promise of the road less travelled, existing perspectives on knowledge creation are beset with a variety of epistemological and methodological problems. This paper develops a new perspective on knowledge creation by delving into existing conceptualisations and classifications of knowledge in literature, exploring the philosophical assumptions upon which they are based, probing the conceptual and methodological issues that surround these views and articulating a new perspective on knowledge creation to guide future research efforts.

Keywords: Innovation, knowledge, knowledge creation, knowledge management

1 Introduction

It is difficult to overstate the emphasis placed on organisational competitiveness in literature (Porter, 1998) and sustainable competitive advantage has been described as the end game in business (Clemons and Row, 1991; Swanson and Ramiller, 2004). However, the literature in the IS field suggests two roads to sustainable competitive advantage. The first road is based on the view that good information is a key element of IS success (cf. DeLone and McLean, 2003) and that good information provision is the key to improving organisational decision making and enhancing organisational competitiveness (March, 1987). Those who have taken this road recognise that knowledge (rather than information) drives competitive advantage (Porter and Millar, 1985; Winter, 1987; Quinn, 1992; Blackler, 1995; Nonaka and Takeuchi, 1995; Dunford, 2000; Gao et al., 2008; Taminau et al., 2009). This road's final destination is the management and utilization of knowledge in such a way that it produces long-term advantages (Soo et al., 2002; Quinn, 1992, p. 241).

The road less travelled is based on the view that the capacity to innovate is “the most important determinant of firm performance” (Crossan and Apaydin, 2010, p. 1154). On this road, innovation is seen as “the creation of new knowledge from the application of existing knowledge” (Gold *et al.*, 2001, p. 190) or as “a process in which the organisation actively develops new knowledge to solve problems” which they themselves create and define (Nonaka, 1994, p. 14). When organisations innovate they “do not simply process information... they actually create new knowledge and information, from the inside out, in order to redefine both problems and solutions and, in the process, to re-create the environment” (Nonaka and Takeuchi, 1995, p.56). These travellers recognise that knowledge creation is at the heart of innovation (Swan et al., 1999; Nonaka et al., 2000; Gold et al., 2001; Popadiuk and Choo, 2006; Lam, 2006). As a result, they argue that the capacity to create and apply new knowledge is one of the main sources of the competitive advantage of the firm (Almeida et al., 2002; Leonard-Barton, 1990; Nonaka, 1991; Spender, 1996; Teece, 1998; Von Krogh, 1998; Zollo and Winter, 2002; Jakubik, 2008; Martin-de-Castro et al., 2008). This road's final destination is the replacement of the input-output or information processing metaphor of old with a new knowledge-creation orientation (Nonaka, 1994; Malhotra, 2000, pp. 2-20; Kogut and Zander, 1996).

Both avenues are united by their view of knowledge as a strategically significant corporate asset but neither has delivered “an understanding of how to operationalise knowledge” (Marr and Spender, 2004, p. 183). This paper develops a new perspective on knowledge and knowledge creation intended to facilitate the pursuit of sustained competitive advantages in firms. The next section considers alternative conceptualisations of the concept of knowledge that have been proposed. Section 3 discusses existing classifications of knowledge. Section 4 considers knowledge creation activities. Finally section 5 formally presents our proposal for a new perspective on knowledge creation.

2 Characterising knowledge

Despite a long standing intellectual fascination with the concept of knowledge, profound definitional ambiguity continues to surround the term. Thus, knowledge is seen as “a broad and abstract notion” (Alavi and Leidner, 2001, p. 107), “a loose, ambiguous, and rich concept” (Alvesson and Kärreman, 2001, pp. 997–1012), or “one of those ‘vague words’ one is at times compelled to use... a ‘loose name’” (Dewey and Bentley, 1949, pp. 48, 87). As such, it is “a highly contentious concept” that is “far too problematic to bear the weight of a useful theory of the firm without a clear statement of the epistemology which gives it meaning” (Spender, 1996, p. 48). In the IS field, knowledge is most commonly defined in relation to its association with information and data. For example, Alavi and Leidner (2001) suggest that knowledge becomes information once it is articulated and presented in the form of text, graphics, words, or other symbolic forms. However, this view has been problematised for a variety of reasons. This section leverages six common characterisations of knowledge (cf. Table 1) that are found in literature with a view to reconceptualising knowledge to guide future research. Commonly occurring components of existing definitions are highlighted in the table using italicised text. By focusing on these elements, it is possible to identify a number of key themes that unite scholars in their conceptualisations of knowledge.

TYPE	EXAMPLES FROM LITERATURE
Knowledge vis-à-vis data and information	<ul style="list-style-type: none"> ⌘ Data is raw numbers and facts; information is processed data; knowledge is <i>authenticated information</i> (Dreske, 1981; Machlup, 1980) ⌘ Knowledge is information possessed in the mind of individuals: it is <i>personalised information</i> (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concepts, interpretations, ideas, observations, and judgments. Information is converted to knowledge once it is processed in the mind of individuals and <i>knowledge becomes information once it is articulated</i> and presented in the form of text, graphics, words, or other symbolic forms (Alavi and Leidner, 2001) ⌘ Knowledge is the addition of human interpretations to information source or the reformulation or <i>interpretation of information</i> in a personalised way. Information is the systematic arrangement of data for a specific purpose (Robert, 2009) ⌘ Knowledge does not exist outside of an agent or knower: it is <i>indelibly shaped by one's needs as well as one's initial stock of knowledge</i>; knowledge becomes information when articulated, verbalised, and structured; this information becomes data when assigned a fixed representation and standard interpretation (Tuomi, 1999)
Knowledge as state of mind (a state of knowing or understanding)	<ul style="list-style-type: none"> ⌘ Knowledge is a condition of <i>understanding gained through experience or study</i>; the sum or range of what has been perceived, discovered, or learned (Schubert <i>et al.</i>, 1998) ⌘ Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides <i>a framework</i> for evaluating and incorporating new experiences and information. It originates and is applied <i>in the minds</i> of knowers. In organisations, it often becomes <i>embedded</i> not only in documents and repositories but also in organisational routines, processes, practices and norms (Davenport and Prusak, 1998, p.3) ⌘ Organisation knowledge is the collective sum of individual knowledge assets which is embedded in people, product, process and structure (Shankar <i>et al.</i>, 2009)
Knowledge as object (to be stored or manipulated)	<ul style="list-style-type: none"> ⌘ Knowledge is that which is objectively known, an intellectual property, attached to a name and a group of names and certified by copyright or some other form of social recognition or more specifically, a set of <i>organised statements of facts or ideas</i>, presenting a <i>reasoned judgment</i> or an <i>experimental result</i>, which is transmitted to others through some communication medium in some systematic form (Bell, 1976) ⌘ Knowledge is a complex and variegated good which can be tacit or codified, localised (context-specific) or abstract (generic) (Grimaldi and Torrissi, 2001)
Knowledge as process (of applying expertise)	<ul style="list-style-type: none"> ⌘ Knowledge <i>cannot 'be divorced from context</i> and transmitted either as abstract data or as universally applicable approaches to problem solving; learning is not a passive process... but an active one' (Heffner and Sharif, 2008) ⌘ Knowledge is a dynamic human <i>process of justifying personal belief</i> toward the truth at the organisational level (Nonaka and Takeuchi, 1995) ⌘ Knowledge is defined as four sets of <i>socially enacted</i> knowledge processes: (i) creation (also referred to as construction), (ii) storage/retrieval, (iii) transfer, and (iv) application (Alavi and Leidner's, 2001) ⌘ Knowledge is conceptualised as knowing in practice; human action plays an essential role in knowing how to get things done in organisations; knowing is not a static embedded capability or stable disposition of actors, but rather an <i>ongoing social accomplishment, constituted and reconstituted</i> as actors engage the world in practice (Orlikowski, 2002)
Knowledge as condition of having access to information	<ul style="list-style-type: none"> ⌘ Knowledge is information that is relevant, actionable, and based at least partially on experience. Knowledge is a subset of information; it is subjective; is linked to meaningful behavior; and it has tacit elements born of experience (Leonard-Barton and Sensiper, 1998)
Knowledge as capability (the potential to influence action)	<ul style="list-style-type: none"> ⌘ Knowledge is not so much a capability for specific action, but <i>the capacity to use information</i>; learning and experience result in <i>an ability to interpret information</i> and to ascertain what information is necessary in decision making (Watson, 1999) ⌘ Knowledge is the capacity (potential or actual) to take effective action in varied and uncertain situations. Knowledge consists of comprehension, understanding, insights, meaning and the ability to anticipate the effect of our actions. Knowledge is neither true nor false. Its value is difficult to measure other than by the results of its actions (Bennet and Bennet, 2008) ⌘ Knowledge is a justified belief that increases an entity's capacity for effective action (Huber, 1991; Nonaka, 1994) ⌘ Knowledge is a <i>capacity</i> that builds on information extracted from data or the set of expectations that an observer hold with respect to an event (Boisot, 1998)

Table 1. An analysis of existing definitions of knowledge (an extension of Alavi and Leidner (2001))

First, these key themes reveal that conceptualisations of knowledge bear the indelible tint of western philosophical arguments. For example, a number of these definitions emphasise the relationships between knowledge, truth and belief and underline the manner in which knowledge is in some way organised, systematic or justified by some means. Second, these themes reinforce a number of philosophically grounded ideas about knowledge that are largely lost when it is conceptualised in terms of information. For example, these themes underline the views that (i) knowledge is created in an instrumental manner for practical purposes (reflecting pragmatist arguments), (ii) knowledge is grounded in experience (reflecting British empiricist arguments) but is social in nature (reflecting social constructionist arguments), and (iii) knowledge is derived by means of cognitive purposeful processes in the mind (a reflection of continental rationalist arguments). Whilst the very nature of knowledge may preclude its reduction to a simple set of distinctions, (Alvesson and Kärreman, 2001), these themes can be synthesised in order to articulate a new characterisation of knowledge. For the purposes of this study, knowledge is therefore characterised as:

A capacity for action or ability to interpret, authenticate, or personalise information and experience; a framework for evaluating and incorporating new experiences and information; this framework is developed through experience or study by means of ongoing, socially enacted processes; it cannot be divorced from context and is shaped by one's needs, initial knowledge frameworks, and experiences.

The view that knowledge is a set of frameworks reflects existing literature and is consistent with conceptualisations of knowledge structures that are found in modern psychology and clinical neurology (cf. Walsh, 1995). Knowledge structures are defined as mental templates that individuals “impose on an information environment to give it form and meaning” (Walsh, 1995, p. 281) or as “organised knowledge about a given concept or type of stimulus” (Fiske and Taylor, 1984, p.149).

3 Classifying knowledge

The proposition that there are different types of knowledge is possibly the most pervasive theme in writing about the nature of knowledge (Nahapiet and Ghoshal, 1998). In the IS field, knowledge taxonomies are commonplace (Faucher *et al.*, 2008) and are seen to be important for designing knowledge systems because they focus attention on the kinds of knowledge to be supported (Alavi and Leidner, 2001). This section focuses on two of the most commonly used classifications of knowledge: the tacit/explicit dimensions of knowledge and the declarative/procedural forms of knowledge.

3.1 Tacit and explicit dimensions of knowledge

The distinction between tacit and explicit knowledge is widely cited (Martín de Castro *et al.*, 2008). Explicit knowledge can be coded in writing or symbols, but only a small part of our knowledge is explicit; in his words, “we can know more than we can tell” (Polanyi, 1966, p. 4). Polanyi (1966) illustrates his argument with the following example: “you can identify one face out of thousands, but it is nearly impossible to give an adequate description of this face to another person, so that she is able to identify the face” (p.4). Thus, tacit knowledge forms the background necessary for assigning the structure to develop and interpret explicit knowledge (Alavi and Leidner, 2001). Polanyi does not fully define tacit knowledge but distinguishes two types of tacit knowledge: the proximal and the distal. Proximal knowledge is fully tacit whilst distal knowledge is ‘specifiably known’ and the functional relation between the two terms of tacit knowing is such that “*we know the first term only by relying on our awareness of it for attending to the second*” (Polanyi, 1966, pp. 9-10). Given adequate means of expression, we can after all communicate what perhaps cannot be put in words. For instance, ostensive definitions (‘naming-cum-pointing’ definitions) conceal “a gap to be bridged by an intelligent effort on the part of the person to whom we want to tell what the word means” (Polanyi, 1966, p. 6).

This distinction is useful for a variety of reasons. Osterloh and Frey (2000) suggest that it is important because it sheds light on the transferability and appropriability of explicit knowledge, as opposed to

tacit knowledge. Whilst explicit knowledge has the character of a public good (with the exception of patents or copyrights), tacit knowledge is acquired by and stored within individuals and cannot be transferred or traded as a separate entity (Osterloh and Frey, 2000).

However, the distinction is problematic theoretically and methodologically. First, Polanyi (1966) recognised that “formalising all knowledge to the exclusion of any tacit knowing is self-defeating” (p.4) because not all tacit knowledge can be made explicit. Similarly, Alavi and Leidner (2001) assert that the assumption that tacit knowledge is more valuable than explicit knowledge “is tantamount to equating an inability to articulate knowledge with its worth” (p.111). Nevertheless, knowledge management has traditionally been concerned with trying to eliminate tacit knowledge rather than finding ways to cope with tacit knowledge (Faucher *et al.*, 2008). Second, Faucher *et al.*, (2008) argue that the perspective has been commonly distorted to hold that data and information are explicit, and knowledge and wisdom are tacit. Third, empirical problems have arisen due to issues associated with attempts to define and operationalise variables relating to the distinction (Rice and Rice, 2005). In particular, there are difficulties associated with investigating tacit knowledge specifically, which is considered difficult to express at a definition level.

The key (but often overlooked) element of Polanyi’s conceptualisation of the tacit and explicit dimensions of knowledge is that the two are not dichotomous states of knowledge; but are instead mutually dependent and reinforcing qualities of knowledge (cf. Polanyi, 1975). Thus, Tsoukas (2005) indicates that Polanyi’s original arguments have been misinterpreted. Further, a number of authors (e.g. Leonard-Barton and Sensiper, 1998; Zander and Kogut, 1995) propose that the distinction between tacit and explicit knowledge should be understood as a continuum rather than as a dichotomy.

3.2 Declarative and procedural knowledge

Whilst scholars commonly and problematically classify knowledge in terms of its tacit and explicit dimensions, Polanyi himself acknowledged that knowing what (declarative knowledge) and knowing how (procedural knowledge) are distinct. Specifically, Polanyi argues that “the ‘*wissen*’ and ‘*können*’, the ‘knowing what’ and ‘knowing how’, have a similar structure and neither is ever present without the other” (p. 7, italics in original). Thus, the development of a skill tends to be accompanied by the development of a deeper understanding of the skill that defies articulation (Polanyi, 1958).

The distinction between declarative and procedural knowledge was first proposed by Ryle (1945), who distinguished between know-*what* and know-*how*. Ryle indicated that know-*what* consists of learning that something is the case whilst know-*how* consists of things like learning to play the piano or to prune trees (Ryle, 2002, p. 28). Declarative knowledge is defined as actual knowledge, expressed in propositions (Andersen, 1983); as knowing about something (Zack, 1999); and is said to concern the development of facts and propositions (Nahapiet and Ghoshal, 1998). Procedural knowledge is defined as methodological knowledge which is used for activities such as remembering how to ride a bicycle or play the piano (Andersen, 1983); as knowledge about something (Zack, 1999); and is said to concern well-practiced skills and routines (Nahapiet and Ghoshal, 1998). The distinction between know-*what* and know-*how* was also developed by Anderson (1976, 1983). Anderson (1976) indicates that there are three essential differences between the two types of knowledge. Declarative knowledge is verbally communicable, is acquired suddenly by means of instruction and is possessed entirely or not at all. Procedural knowledge is not verbally communicable, is gradually acquired by means of performance of a skill and may be partially possessed. According to Chia (2003), the art of doing (procedural knowledge) has been overshadowed by the art of reasoning, justification and the mastery of language (declarative knowledge). However, research on implicit learning and cognitive neuroscience evidence indicates that “these two types of knowledge are implemented neurally in fundamentally different ways” (Anderson and Lebiere, 1998, p. 21).

Taken together, the analysis presented in Sections 3.1 and 3.2 argues in favour of recognizing the tacit and explicit dimensions of knowledge but classifying knowledge in terms of declarative and procedural knowledge.

4 Focusing on Knowledge Creation

As indicated in Section Two, scholars increasingly recognise that knowledge creation is centrally important in terms of organisational competitive advantage in general (Almeida et al., 2002; Leonard-Barton, 1990; Nonaka, 1991; Spender, 1996; Teece, 1998; Von Krogh, 1998; Zollo and Winter, 2002; Jakubik, 2008; Martin-de-Castro et al., 2008) and for organisational innovation (Swan et al., 1999; Nonaka et al., 2000; Gold et al., 2001; Popadiuk and Choo, 2006; Lam, 2006) in particular. The discussion presented in this section is structured according to Table 2, which presents an analysis of existing conceptualisations of knowledge creation in literature.

VIEW	DEFINITION	AUTHOR(S)
Knowledge creation as extending existing knowledge stocks	Organisational knowledge creation involves developing new content or replacing existing content within the organisation's tacit and explicit knowledge	Pentland (1995); Alavi and Leidner (2001, p. 116)
	New knowledge consists of "discoveries about phenomena that were not known previously... knowledge creation is a path-dependent process... [whereby] newly acquired inputs are integrated with existing knowledge stocks"	McFayden and Cannella (2004, pp. 735-736)
Knowledge creation as (spiral) conversion process	Organisational knowledge creation: "an upward spiral process, starting at the individual level moving up to the collective (group) level, and then to the organisational level, sometimes reaching out to the interorganisational level"	Nonaka (1994, p. 20)
	Organisational knowledge creation is "a spiralling process of interactions between explicit and tacit knowledge. The interactions between these kinds of knowledge lead to the creation of new knowledge. The combination of the two categories makes it possible to conceptualise four conversion patterns... Each of the four conversion modes can be understood as processes of self-transcendence"	Nonaka and Konno (1998, p. 42)
	Organisational knowledge creation is "the capability of a company as a whole to create new knowledge, to effectively disseminate it throughout the organisation (i.e. to where it is needed) and to embody it in products, services and systems". Knowledge is created when "tacit and explicit knowledge are transformed into one another through four processes: Socialization, Externalization, Internalization, Combination"	Nonaka and Takeuchi (1995 p. viii)

Table 2. Existing conceptualisations of knowledge creation

The conceptualisation of *knowledge creation as a process of extending existing knowledge stocks or knowledge assets* is exemplified by Alavi and Leidner (2001) who argues that knowledge creation involves "developing new content or replacing existing content within the organisation's tacit and explicit knowledge" (p. 116). This perspective is informed by traditional perspectives on knowledge management. Specifically, it builds upon conceptualisations of knowledge as an object; as a condition of having access to information; and as a process (cf. Table 1). In addition, the distinction between tacit and explicit knowledge is at the heart of this view of knowledge creation. In addition, this conceptualisation of knowledge creation extends what Compton and Jansen (1990) refer to as the "physical symbol hypothesis", whereby knowledge is seen to consist of "symbols of reality and relationships between these symbols"; and "intelligence is the appropriate logical manipulation of the symbols and their relations" (p. 2). This conceptualisation of knowledge creation underlines the fact that "knowledge resides within and is created by individual" (McFayden and Cannella, 2004, p. 736). This is because "the know-how and information that individuals gain over time forms their knowledge stocks" which in turn "shape the scope and direction of the search for new knowledge" (McFayden and Cannella, 2004, p. 736). Thus, Von Krogh (1998) observes that both exploration and exploitation are important in the quest to continually build knowledge but that exploration (which involves trying new processes and developing ideas that are outside an organisation's repertoire of routines) in particular is useful in stimulating knowledge creation. This emphasis on process based research has meant that few authors have considered the conditions that give rise to knowledge creation. Thus, there is little understanding of how knowledge is created (Nonaka *et al.*, 2000, p. 4; McFayden and

Cannella, 2004; Yang *et al.*, 2010) or of how the knowledge creation process can be effectively managed (cf. Yang *et al.*, 2010) or evaluated (cf. Chen and Edgington, 2005) in firms.

The conceptualisation of *knowledge creation as a spiral process of conversion* is rooted in the ‘SECI’ model of knowledge creation. This model was first proposed by Nonaka (1991; 1994) and has been extended by a number of authors (cf. Nonaka *et al.*, 1994; Nonaka and Takeuchi, 1995; Nonaka and Konno, 1998; Nonaka *et al.*, 2000; Nonaka and Toyama, 2003). The SECI model is one of the most widely cited theories in knowledge management and is the most widely cited model of the knowledge creation process in particular (Cao *et al.*, 2010; Gourlay, 2003). The distinction between tacit and explicit knowledge is at the heart of the SECI model. According to Nonaka (1994), tacit knowledge is “a continuous activity of knowing” and communication between individuals may be seen as “an analogue process that aims to share tacit knowledge to build mutual understanding” (pp. 16-17). In contrast, Nonaka (1994) indicates that explicit knowledge is discrete and is captured in records of the past and is accessed sequentially (Nonaka, 1994). According to Nonaka (1994, p. 18), the SECI model postulates that there are four different modes of knowledge conversion:

- Socialization (tacit knowledge is converted to tacit knowledge)
- Externalization (tacit knowledge is converted to explicit knowledge)
- Combination (explicit knowledge is converted to explicit knowledge)
- Internalization (explicit knowledge is converted to tacit knowledge).

During *socialization*, tacit knowledge is exchanged through joint activities rather than through written or verbal instructions. Thus, socialization involves “capturing knowledge” through “physical proximity” (Nonaka and Konno, 1998, pp. 42-43). *Externalization* “requires the expression of tacit knowledge and its translation into comprehensible forms that can be understood by others”; thus techniques such as dialogue, metaphor, analogy and narrative can support externalization (Nonaka and Konno, 1998, pp. 43-44). *Combination* involves the conversion of explicit knowledge into more complex sets of explicit knowledge and the key issues at this stage are systematising knowledge and knowledge communication and diffusion processes (Nonaka and Konno, 1998, pp. 44-45). Finally, *internalization* requires individuals within the organisation to identify knowledge that is relevant to them within organisational knowledge (Nonaka and Konno, 1998, p. 45). Internalization is accomplished by means of learning- by-doing, training, and exercises (Nonaka and Konno, 1998, p. 45). Nonaka (1994) explains that each of the four knowledge conversion modes can create new knowledge independently but the “central theme” of the model “hinges on a dynamic interaction between the different modes of knowledge conversion” (p. 20). In particular “the articulation of tacit perspectives in a kind of ‘mobilization’ process” is a key factor in the creation of new knowledge (Nonaka, 1994, p. 16). Nonaka further distinguishes between individual and organisational knowledge creation arguing that organisational knowledge creation takes place when all four modes are ‘organisationally’ managed to form a continual cycle. Nonaka indicates that even though individuals’ tacit knowledge is at the heart of knowledge creation, organisations realise the practical benefits of knowledge through externalization and amplification (through dynamic interactions between all four modes of knowledge conversion) (Nonaka, 1994, p. 20). Thus, the interaction between individuals, groups and organisations is at the heart of the process of knowledge creation. When this happens, tacit knowledge is “mobilised through a dynamic ‘entangling’ of the different modes of knowledge conversion in a process which will be referred to as a ‘spiral’ model of knowledge creation” (Nonaka, 1994, p. 20).

Scholars have identified a number of conceptual and empirical problems with the SECI model, which is the dominant view of knowledge creation in literature (Cao *et al.*, 2010; Gourlay, 2003). In terms of the *conceptual problems associated with the SECI model*, Gourlay (2006) argues that there is “always an irreducibly tacit aspect to any explicit knowledge/knowing” (p. 1422); therefore any model of knowledge creation processes that begins with tacit knowledge must account in some way for inherently as well as contingently tacit knowledge. Adler (1995) indicates that the contrast between tacit and explicit knowledge is conceptualised in the SECI model in too rigid a manner to facilitate the development of a dynamic model of tacit-explicit knowledge inter-relatedness. Spender (1996) argues

that the four knowledge conversion modes are simply “the means of communicating the two modes of knowing around the firm” (p.51). Finally, Gourlay (2006) also problematises the distinction made between combination and internalization, arguing that they appear to be ambiguous notions that conflate knowledge creation and transfer. Thus, Nonaka *et al.*, (2006) define organisational knowledge creation without making reference to either tacit or explicit knowledge. Instead, the authors define organisational knowledge creation as “the process of making available and amplifying knowledge created by individuals as well as crystallizing and connecting it to an organisation’s knowledge system. In other words, what individuals come to know in their (work-) life benefits their colleagues and, eventually, the larger organisation” (p.1179). In addition, scholars (e.g. Spender, 1996; Gourlay, 2006) argue that the SECI model omits important philosophers and misreads several important organisational writers. For example, Spender (1996) argues that the model deviates from the argument that organisations learn by means of acquiring better routines (cf. Nelson and Winter, 1982). Further, Jorna argues that the model omits a discussion of earlier work on the distinctions between tacit and declarative knowledge. Furthermore, Jakubik (2008) problematises the asset view of knowledge found in the SECI model. Empirical work on the knowledge creation is also lacking (McFayden and Cannella, 2004; Rice and Rice, 2005). In the course of this study, only three studies (Nonaka *et al.*, 1994; Chou and He, 2004; Chou and Tsai, 2004) were identified which investigated the SECI model empirically. The findings of these studies support the existence of four knowledge conversion modes (Nonaka *et al.*, 1994) and suggest that knowledge assets in organisations influence knowledge creation (Chou and He, 2004; Chou and Tsai, 2004). The empirical difficulties associated with the SECI model are believed to stem from the fact that the boundaries between explicit and tacit knowledge are indistinct in the model. This makes the statistical testing of SECI-derived propositions difficult (Rice and Rice, 2005).

5 A new perspective on knowledge creation

Having critiqued extant conceptualisations of knowledge creation in literature, this section leverages the characterisation of knowledge (Section Two) and the analysis of extant knowledge classifications (Section Three) in order to derive a new characterisation of knowledge creation to guide future research. This paper proposes to characterise knowledge creation as:

Changes to frameworks used for evaluating and incorporating new experiences and information; these changes affect the capability to interpret, authenticate or personalise both information and experience; these changes occur through experience or study by means of ongoing, socially enacted processes; they cannot be divorced from context and are shaped by one’s needs, initial knowledge frameworks, and one’s experiences.

This characterisation supports the view that knowledge is a set of evolving ‘frameworks’ that provide a capacity for action and that it is shaped by experience, study and ongoing, socially enacted processes. This characterization is reminiscent of Kohonen’s concept of the (dynamic, associative) self-organizing map, where learning results are influenced by what already exists in the system (Honkela, 2005). In other words, this characterisation suggests that knowledge is created in a manner that relates to existing knowledge. Thus, it views knowledge as being relativistic in nature and does away with the idea that the creation of knowledge in some way involves the generation of independently or objectively new knowledge. This conceptualisation therefore signals a departure from existing research based on the capture or acquisition of knowledge. At the same time, it is not based upon the distinction between tacit and explicit knowledge but is commensurate with the distinction between declarative and procedural knowledge. Figure 1 graphically depicts the conceptual model of knowledge creation constructed in this paper.

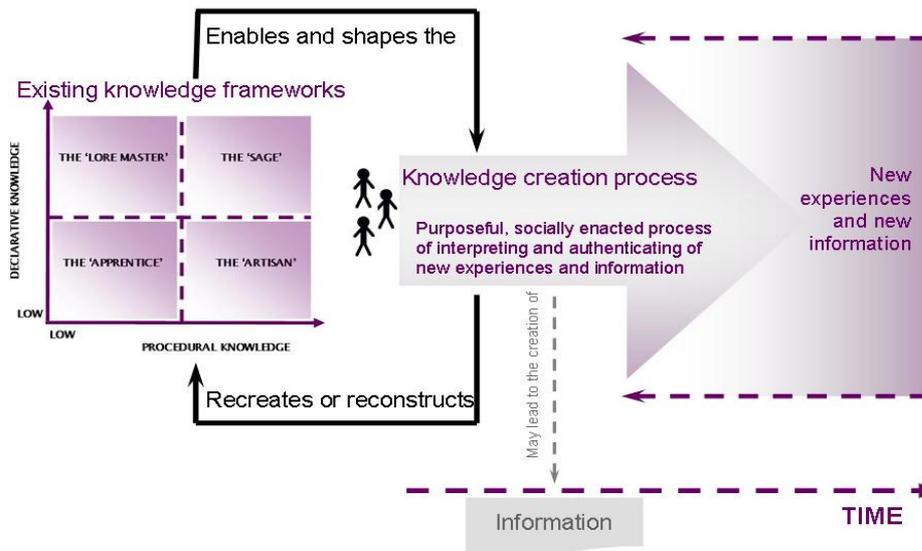


Figure 1. Proposing a conceptual framework of the knowledge creation process

Figure 1 describes knowledge creation as an ongoing purposeful, socially enacted process of interpretation and authentication that can take place as a result of new experiences and information. Knowledge creation can take place at multiple levels of analysis. Opportunities for knowledge creation exist whenever new experiences and new information are encountered by knowledge creators. The framework indicates that depending on the context at hand, the knowledge creator (be it an individual, group or organisation) is able to draw upon its existing knowledge frameworks and these are used both to enable and to shape the knowledge creation process. In turn, existing frameworks are recreated and reconstructed over time as a result of the knowledge creation process. Information may also be created as a by-product of this process. This may depend on the tacitness/explicitness of created knowledge.

Further, the framework suggests (in accordance with the analysis presented in Section 3) that researchers classify existing knowledge frameworks based on the distinction between declarative and procedural knowledge. In order to illustrate this argument, the framework proposes four knowledge creator archetypes. The first archetype is referred to as the **lore master**. This knowledge creator has the capacity to draw on high levels of both declarative and procedural knowledge in a given knowledge creation context. This archetype stands in contrast with the second archetype: the **apprentice**. The apprentice has the capacity to draw on low levels of both declarative and procedural knowledge in a given knowledge creation context. The third archetype, the **sage**, has the capacity to draw on high levels of declarative knowledge but this is not matched with high levels of procedural knowledge. This archetype is contrasted with the fourth archetype, the **artisan**, who has the capacity to draw on high levels of procedural knowledge but this is not matched with high levels of declarative knowledge.

This framework can be used to guide future research on knowledge creation in a variety of ways. In the first instance, the framework directs future researchers to focus on developing new ways of assessing existing knowledge levels in different contexts. Future research is also needed to explore these archetypes in greater detail. In particular, there is a need to establish the validity and utility of distinguishing between four archetypes. At the same time, future research is needed to establish how to IS/IT interventions should be designed to support the interactions between existing knowledge frameworks and the knowledge creation process in each of the four modalities that are suggested by the four archetypes. Finally, the framework is intended to operate at multiple levels of analysis. This means that it can be used as a basis upon which to explore the interactions that occur between knowledge creation processes at different levels of analysis (e.g. at the individual level versus the group level).

In summary, this paper has suggested that knowledge is the key to sustained competitive advantage in organisations. However, whereas IS researchers have traditionally focused on leveraging knowledge by focusing on effective information provision, this paper takes a road less travelled by highlighting the central role of knowledge creation for innovation in general and for sustained competitive advantage in particular. The paper has therefore delved into existing conceptualisations and classifications of knowledge in literature, explored the philosophical assumptions upon which they are based, probed the conceptual and methodological issues that surround these views and articulated a new perspective on knowledge creation to be used to guide future research efforts.

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