CONCEPTUALIZING KNOWLEDGE CREATION, CONVERSION AND TRANSFER

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Abstract

Knowledge is a crucial resource for organizational functioning, innovativeness, performance, and competitiveness, and it is believed to be the last competitive advantage that organizations have, be it academic or corporate, small to medium enterprises, and non-government and government organizations. Thus, an understanding of the knowledge creation, conversion, and transfer process is important not only for the development of society, but for the growth and development of organizations.

This paper reports the conceptual understanding of the general knowledge creation and transfer process, which understanding if appropriately applied, could hold organizations in good stead, place them at the forefront of innovation and, help them gain a competitive advantage. What seems lacking in the literature is the application of the knowledge creation, conversion, and transfer process, for example, in a post-graduate research environment, where knowledge co-creation takes place.

Keywords: information, knowledge management, knowledge creation, knowledge conversion, knowledge transfer.

Conceptualizing Knowledge Creation, Conversion and Transfer

Donate and Canales (2012) believe it is widely accepted that we live in a knowledge economy. The paramount importance of knowledge has been recognized by many scholars in recent years, and knowledge is different to that of tangible resources, in that it grows when used. In contrast, most tangible resources tend to depreciate with use, whereas when one person transfers knowledge to another, both now have access to and share that knowledge. In practice, the process the giver uses to access knowledge may result in him/her seeing the subject from a new perspective, as well as allowing the receiver to combine the new knowledge with that gained from previous experience to generate a completely new insight (McKenzie and van Winkelen, 2006). It is more and more imperative to cope with the challenges of creating, sharing and applying knowledge in order for knowledge to produce desired outcomes (Donate and Canales, 2012).

Mitchell and Boyle (2010) disclosed that knowledge creation refers to the initiatives and activities undertaken towards the generation of new ideas or objects. Depending on the context, the term knowledge creation is described and defined differently. As a process, knowledge is defined in terms of the method or means through which it is created, and can be differentiated from the end result or output. The creation of knowledge therefore refers to the development of new ideas that reflect a significant elaboration or enrichment of existing knowing. As an output knowledge is defined in terms of an immediate product of the knowledge creation process, such as the representation of an idea, and can be differentiated from its impact on the organizational system, or outcome and which refers to a value-adding object.

According to Pinho et al. (2012), knowledge creation results from the interplay between individuals and organizations, from which successive conversions from tacit into explicit knowledge emerge. Knowledge creation is enabled by the processes and activities of interaction, feedback, innovation, brainstorming, and benchmarking. Knowledge conversion is made possible through the processes and activities of synthesis, refinement, integration, combination, coordination, distribution, and restructuring of knowledge. Shared contexts and common representation are required for knowledge conversion, and facilitated by group problem solving and decision-making. Information technologies like e-mail, repositories, internet portal, teleconferencing, and the activities of mentoring, collaboration, and training play a key role in transferring knowledge. Forums such as communities of practice and centers of excellence, and training provide a platform for the transfer of knowledge. Knowledge is effectively applied during the developmental processes of an organization through rules and directives, routines and self-organized teams. Knowledge is applied to formulate and refine the standards, procedures, and processes developed to execute tasks within the organization (Sandhawalia and Dalcher, 2011).

Jakubik (2011: 380) cites Cook and Brown (1999), who believe that in interconnected communities "there is a need for a better understanding and better models of how this essentially non-transferable or 'situated' dimension of knowledge and knowing, as elements of an organization's core competency, can be 'generated in' rather than 'transferred to' other groups or organizations". Furthermore, Gourlay (2006) as cited in Jakubik (2011: 380) argues that the view that knowledge is created through and interaction of tacit and explicit knowledge involving four modes of conversion is flawed. Jakubik (2011: 380-381) highlights one of Gourlay's (2006) valid viewpoints, that is, "the knowledge creation framework of Nonaka (1994) has conceptual

difficulties and it lacks conceptual clarity. For instance; the radically subjective definition of knowledge as 'justified true belief' is misleading because too high a role is given to the manager's beliefs in this process and it omits scientific forms of knowledge".

McNichols (2010: 25) cites Karlsen and Gottschalk (2003: 113) to understand the term *knowledge transfer.* Knowledge transfer can occur 'between individuals, from individuals to explicit sources, from individuals to groups, between groups, across groups, and from the group to the organization, and social relationships provide the support in which individuals can create, retain, and transfer knowledge (McNichols, 2010). According to van den Hooff et al. (2012), knowledge transfer is the process where individuals mutually exchange their (tacit and explicit) knowledge and jointly create new knowledge. This implies that individuals make their knowledge collective through sharing, which means that the relationship between the individual and the collective (community, group, team or organization) is a central aspect of knowledge sharing behaviour.

Zhou et al. (2010) believe an individual's personal network is important for the effectiveness of knowledge transfer. When one requires information or knowledge, he/she will rely on his/her social network to a large extent. The aforementioned researchers emphasize that connectivity/interaction is key to acquire information and to achieve one's goal, by taking note of Burt's (1992) structural holes theory. Structural holes connect actors who are themselves unconnected, thus achieve more original information (Zhou et al., 2010). To enhance their argument, the aforementioned researchers take to 'tie strength' where it was shown (Hansen, 1999) that although weak tie facilitates knowledge transfer in an explicit environment, strong tie is more likely to lead to tacit knowledge transfer because it loads more trustworthiness (Zhou et al., 2010). Sandhawalia and Dalcher (2011) proposes that distinct expertise should be shared

between members of a group or employees within an organization with a sufficient level of congruence to enable individuals to understand each other and work together towards their common goals from different perspectives. The conflation of unconnected aspects or recombining previously associated aspects creates common knowledge; as individuals realize that tasks are better achieved through dynamic interaction and feedback. In this way, organizations are likely to create new and common knowledge and engage in effective transfer and integration of knowledge to achieve their predefined goals. Knowledge use is associated with people and behaviour and organizations benefit when knowledge is shared in context and according to need (Sandhawalia and Dalcher, 2011).

Swift et al. (2010) argue that when an individual offers any fraction of their knowledge to another, whether it is achieved directly through communication or indirectly through mechanisms, such as the use of a knowledge archive, they are engaging in knowledge transfer. Knowledge transfer requires social interaction that occurs within a system, where knowledge represents a resource that has a value. The path to obtaining knowledge may depend on the situation one is in, and more importantly an individual's willingness to share. By citing several researchers, inter-alia (Reagans and McEvily, 2003; Kankanhalli et al., 2005; So and Bolloju, 2005), Swift et al. (2010: 379) highlight certain inconsistencies with knowledge transfer. For example, Reagans and McEvily (2003) found that individuals were more willing to share when they perceived it would require less effort to articulate their knowledge or they could develop a negative reputation for not sharing, but Kankanhalli et al. (2005) found that the level of effort only matters when there is a lack of trust and a study by So and Bolloju (2005) ascertained that a perceived social norm for knowledge sharing had no effect on intentions to share knowledge. The effect of rewards on knowledge sharing has also been mixed with some studies finding that

individuals' knowledge sharing behaviour is positively affected by the potential for organizational rewards or co-worker reciprocity.

Some researchers such as Jakubik (2011) recognize that a few academics call for more research on knowledge creation. Thus, in order to partially address the above, this paper explores the conceptual process of knowledge creation and transfer by initially explaining and differentiating among the concepts knowledge, data, and information. Thereafter, the discussion moves to an explanation of tacit and explicit knowledge, and progresses to an explanation of the knowledge spiral and the concept of Ba in knowledge creation and transfer. The paper concludes with a brief discussion of the knowledge enablers.

Research Rationale and Methodology

This paper represents the theoretical underpinning of an empirical study, which was conducted as stage two of the research in compiling a dissertation for a masters degree. The main study was motivated by the fact that the influence of Nonaka and Takeuchi's (1995) knowledge (SECI) spiral theory had not been investigated to ascertain its impact on post-graduate-students, more specifically, to understand how they create and transfer their knowledge.

In order to develop the conceptual understanding prior the questionnaire design and empirical research, the relevant literature on the subject had to be retrieved from various electronic databases, inter-alia, Emerald, Ebscohost, Googlescholar, etc. using 'word searches'. The key words were typed in and relevant research articles were downloaded and scrutinized for relevance and salient and relevant information extracted and incorporated in the literature review.

The review was structured to depart from a general understanding of knowledge, more especially, explicit and tacit knowledge, to a deeper understanding of the genesis of the knowledge spiral. The primary focus of the literature study was to develop a theoretical understanding of Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model and the four modes of knowledge conversion that are embedded within the knowledge spiral so as to be able to use this understanding a later stage to empirically evaluate its application in various knowledge environments.

<div align="center">**Literature Review**</div>

Knowledge, Data and Information

According to Boisot and Canals (2004: 43), "some associate information with data and others associate information with knowledge". Stair and Reynolds (2001) assert that data consists of raw facts, and Davenport and Prusak (1998) in Qureshi et al. (2006) suggest that data is a set of discrete, objective facts about events, and view data as simple facts that have no meaning outside the context in which they were collected. Lacking the context in which they were collected, one cannot accurately understand the symbols, even if one recognizes them (Qureshi et al., 2006). Data is a product of observation, and information is a transformation of data into a more effective and usable forms (Dadzie et al., 2009).

Information is considered as the understanding of the relationships among data in the context in which they are presented (Qureshi et al., 2006). Boisot and Canals (2004: 44) provide the following example to understand the term information, ". . . receiving an encrypted message for which you possess the key and from which you extract the following information: 'The cat is tired'. Unless you possess enough contextual background knowledge to realize that the message refers to something more than an exhausted cat, you may not be in a position to react in an

adaptive way. To understand the sentence is not necessarily to understand the message. Only prior knowledge will allow a contextual understanding of the message itself, and the message, in turn will carry information that will modify that knowledge."

Suppiah and Sandhu (2011) pose an effective question, *what is knowledge?* To answer this question, the authors interpret Guba (1990), and accept as truth that there is no particular widespread explanation of the term knowledge. Suppiah and Sandhu (2011: 464) extract from Guba (1990) who stated that "*having the term not cast in stone is intellectually useful* as the possibility of reshaping according to our understanding of its implications improves." Alavi and Leidner (2001: 107) lend further support to this argument when they describe knowledge as a "broad and abstract notion that has defined epistemological debate in western philosophy since the classical Greek era".

Jakubik (2011: 375) concludes that "debates and discourses in knowledge management articulate the need for better understanding of the emerging community view of knowledge, where knowledge is embedded in human actions and interactions, in situated practices". According to Davenport and Prusak (2000) as cited by Rai (2011: 780), "knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. Knowledge often becomes embedded not only in documents or repositories, but also in routines, processes, practices, and norms." Pinho et al. (2012: 216) cite an array of contemporary authors (such as Carneiro, 2000; Chen et al., 2010; Drucker, 1993; Grant, 1996; Kazemi and Allahyari, 2010; Mills and Smith, 2011; Spender, 1996; Birkinshaw and Sheehan, 2002; Zyngier, 2006) and define knowledge as a "*dynamic human process of justifying personal belief toward the truth,"* and is a crucial resource for organizational functioning, innovativeness, performance, and

competitiveness. It is a valuable intangible resource that should be managed dynamically by any organization hoping to achieve competitive advantages. Therefore, knowledge that is contained in the minds of organizational members is the greatest organizational resource and managing this knowledge is one of the central challenges of our time (Pinho et al., 2012; Rai, 2011).

Rai (2011: 781) cites Malhotra (1998), who defines knowledge management as "a synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings". Rai (2011: 781) further cites Rastogi (2000: 40), who defined knowledge management as a "systematic and integrative process of coordinating organization-wide activities of acquiring, creating, storing, sharing, diffusing, developing, and deploying knowledge by individuals and groups in pursuit of major organizational goals". Suppiah and Sandhu (2011: 464) state that "since time, immemorial people have been implicitly managing knowledge as they went about their daily activities". Pinho et al. (2012: 217) take cognizance of the argument by Corso et al. (2009: 74) that knowledge management is about "creating an environment that encourages people to learn and share knowledge by aligning goals, integrating bits and pieces of information within and across organizational boundaries, and producing new knowledge that is usable and useful to the organization".

Tacit and Explicit Knowledge

Several researchers (Joia and Lemos, 2010: 412; Arling and Chun, 2011: 232; Rai, 2011: 781) state that Nonaka's (1994) theory is based on Polanyi's (1966) notion that there are two types of knowledge, explicit and tacit. In attempting to explain that all knowledge as either tacit or explicit Polanyi (1966: 4) commented that "*we can know more than we can tell*". Wang and Han (2011: 804) state that Polanyi (1966) categorized knowledge into two types: explicit

knowledge and implicit (tacit) knowledge – the extent to which the knowledge consists of implicit and non-codifiable skills or 'know-how', since explicit knowledge can be codified and easily articulated since it can be expressed formally and systematically, and this type of knowledge is easy to learn and disseminate.

Arling and Chun (2011: 232) argue that explicit knowledge can be articulated, codified and transmitted in some type of symbolic form or natural language, and it (explicit knowledge) is objective and rational, can be documented and distributed to others, which include guidelines, procedures, white papers, reports, strategies and others. Rai (2011: 781) asserts that "knowledge may dynamically shift between tacit and explicit over time, but some knowledge will always remain tacit".

Oguz and Sengün (2011: 446) put forth the argument that "tacit knowledge as a concept has its origins in Polanyi's (1966) writings. Polanyi's (1966) aim was to bring forward the inarticulate dimension of human knowing". Tacit knowledge is the direct opposite of explicit knowledge. Rai (2011: 781) reveals that "tacit knowledge, also known as embedded and sticky knowledge, is subjective and experience based knowledge, which cannot be expressed in works, sentences, number or formulas, etc.. This also includes cognitive skills such as beliefs, images, intuition, and mental models as well as technical skills such as craft and know-how". Arling and Chun (2011: 232) enlightened by Nonaka (1994) and (Polanyi, 1966), construe that "tacit knowledge has a personal quality, and is rooted in action, commitment and involvement in a specific context. Tacit knowledge is difficult to articulate, and is often characterized as personal skills, mental models, and 'know-how' that are deeply ingrained in an individual". Upon evaluating Nonaka and Konno's (1998) research, Rai (2011: 781) proposes that "tacit knowledge is deeply embedded in an individual's actions and experience as well as in his/her ideals, values,

or emotions". Tacit knowledge is acquired through inner individual processes such as experience, reflection, internalization and individual talent, the personal component is the determining factor for the sharing of tacit knowledge (Joia and Lemos, 2010). Although both types of knowledge have distinguishing features between them, they complement each other so far as knowledge creation and conversion in organizations is concerned.

Holste and Fields (2010) cite Foos et al. (2006), who consider that face-to-face interaction often is the primary method for transferring tacit knowledge. The levels of risk and uncertainty that are associated with tacit knowledge transfer are reduced by trusting relationships. Key to both formal and informal tacit knowledge transfer is the willingness and capacity of individuals to share what they know and to use what they learn". The transfer of tacit knowledge is by no means a voluntary action. The individual in a group/social context should for one have a willingness to share and/or use tacit knowledge. Furthermore, groups may have limited awareness of the tacit knowledge an individual possesses. On the other hand, individuals may perceive the distribution of their tacit knowledge as a considerable risk; principally as one may deduce that their competitive advantage over peers will dwindle away.

The Genesis of the Knowledge (SECI) Spiral Process

Knowledge is sought and shared in a global arena, be it at a corporate or academic level (Hautala, 2011). McKenzie et al. (2011: 403) plainly argue that sound decisions rely on having the right knowledge in the right place at the right time, to be able to act effectively. "Right" knowledge may be different for every decision – some decisions require only surface knowledge, some require more investigation and an evidence base, some use tacit expertise, and others creative insight, intuition, and judgement. Knowledge is a raw material, work in process, and deliverable in almost any context and deciding on what knowledge to use when making decisions

is a critical organizational, group, team, and individual responsibility. Rai (2011) believes that despite the subtle differences between the various knowledge definitions, scholars agree that effective and efficient knowledge management is central to organizational performance and success. In order to assess the capacity of an organizational system to generate new knowledge, the first step is to define knowledge and then how to determine if it is "new", since new knowledge increases an entity's capacity for effective action (Arling and Chun, 2011).

The conversion of tacit knowledge into explicit knowledge helps to crystallize and share it by others, which becomes the basis for the creation of new knowledge. The successful conversion of tacit knowledge into explicit knowledge depends on the sequential use of metaphor, analogy, and models (Rai, 2011). The materialization of new knowledge always begins with the individual. A resourceful individual may become conscious of a position that has not been developed, which may lead to the growth/advancement of a product, service or theory. "An individual's personal knowledge is transformed into the organizational knowledge valuable to the company. Making personal knowledge available to others is the central activity of the knowledge creating company. Nonaka and Konno (1998: 26) argue that "it takes place continuously and at all levels of the organization". One's personal knowledge is transformed into organizational knowledge through the interactions between tacit knowledge and explicit knowledge.

Knowledge is created, transferred, and stored through the social interaction between tacit and explicit knowledge. The interaction between tacit and explicit knowledge is known as knowledge conversion. According to Renzl (2006), within several loops of interaction where community members share their experiences, ideals and ideas, and new knowledge, individual as well as collective knowledge emerges. Oguz and Sengün (2011: 446), assert that Nonaka and

Takeuchi (1995) popularized tacit knowledge in the management literature, by using the example of the bread master. Their work legitimized the tacit-explicit dichotomy by viewing the two as separate spheres of knowledge. Even though they cited Polanyi (1966) approvingly, the ontological dimension of knowing remained inconspicuous. In their view, knowledge creation is the result of an interactive spiral between tacit and explicit knowledge. This rendition has been widely accepted in most of the following literature and has created the tendency to see tacit and explicit knowledge as substitutes (Nonaka and Taheuchi, 1995: 219). According to Nonaka and Takeuchi (1995), there are four ways of knowledge conversion between tacit and explicit knowledge, and these are as following:

(1)   socialization (tacit to tacit);

(2)   externalization (tacit to explicit);

(3)   combination (explicit to explicit); and

(4)   internalization (explicit to tacit).

Nonaka (1994) provides an example of product developers at the Osaka-based Matsushita Electric Company, who were hard at work on a new home bread making machine. The product developer's were having trouble getting the machine to knead dough correctly. The employees tried analyzing the problem exhaustively, but failed to come up with a solution. Software developer, Ikuko Tanaka stepped up to the plate and suggested a creative solution as well as proposed that she train in Osaka International's hotel with the head baker, to study his kneading technique. Through observation she noticed that the baker had a distinctive technique of stretching the dough. After a year of trial and error, working closely with the project's engineers, Ikuko Tanaka then came up with product specifications – that successfully reproduced the

baker's stretching technique and quality of the bread. The result for the Matsushita Electric Company's product was record sales in its first year for a new kitchen appliance (Nonaka, 1994).

Ikuko Tanaka's innovation illustrated a movement between two different varieties of knowledge. The end point of the movement is 'explicit' knowledge, which is the product specification for the bread making machine. Explicit knowledge is formal and systematic. For the aforementioned reason, explicit can be easily communicated, transferred, and shared, in product specifications or a scientific formula or a computer program (Nonaka and Konno, 1998: 27). Explicit knowledge is treated as a kind of surface pool that is easier to detect and capture, but which represents only a fraction of the organizational knowledge (Mooradian, 2005).

The starting point of Ikuko Tanaka's innovation as per Nonaka and Takeuchi (1995) is from another kind of knowledge that is tacit knowledge. Dayan and Evans (2006) consider tacit knowledge as the knowledge that individuals carry around in their minds, that is, it is their experience and their expertise, and transforming it into an organizational asset is not straightforward. The tacit knowledge stemmed from the head baker at the Osaka International Hotel. "Tacit knowledge is highly personal. It is hard to formalize and, therefore difficult to communicate to others. Tacit knowledge is also deeply rooted in action and in an individual's commitment to a specific context – a craft or possession, a particular technology or product market, or the activities of a work group or team. Tacit knowledge consists partly of technical skills – the kind of informal, hard-to-pin down skills captured in the term 'know-how'. At the same time, tacit knowledge has an important cognitive dimension. It consists of mental models, beliefs, and perspectives so ingrained that we take them for granted, and therefore cannot easily articulate them. For this very reason, these implicit models profoundly shape how we perceive the world around us" (Nonaka and Konno, 1998: 27-28). Grant (2007) views tacit knowledge as

the ability or skill of an individual to do something or to resolve a problem that is based, in part, on one's own experiences and learning. Grant (2007) further states that with the appropriate use of language, perhaps most but probably not all, of this knowledge can be shared between individuals. Capturing tacit knowledge is seen as the challenge to organizations that want to spread knowledge throughout the organization or spur greater innovation. It is treated as a reserve deposited deep within the ground that needs to be detected and then pumped out (Mooradian, 2005).

Nonaka and Takeuchi (1995), the pioneers of the knowledge spiral model believe that tacit and explicit are not totally separate but mutually complementary entities. This led them to further develop the notion that tacit and explicit knowledge interact with and interchange into each other in the creative activities of human beings. Knowledge is created, transferred, and stored through the social interaction between tacit and explicit knowledge. The interaction between tacit and explicit knowledge is known as knowledge conversion, which consists of four modes, commonly referred to as SECI, which Girard (2006) believes need to operate in sync. The four modes of knowledge conversion consist of socialization, externalization, combination, and internalization (SECI), which are depicted in Figure 1. Socialization helps move knowledge in tacit form between individuals (in this instance post-graduate students), externalization is the application of tacit insights on an outside entity, combination represents the act of synthesizing explicit pieces of knowledge, and finally internalization is the process whereby one increases their knowledge by learning from external events (Desouza and Awazu, 2006).

It is important to stress that the success of each mode of knowledge conversion will depend on the leadership and culture of the organization or team. After all, managing knowledge is all about creating a culture that will institutionalize trust and facilitate knowledge creation, transfer, and storage (Kermally, 2002). Girard (2006) believes that it is of paramount importance for leaders/organizations to strive to maximize the use of each of the knowledge conversion modes.

	Tacit Knowledge	*To*	Explicit Knowledge
Tacit Knowledge	**SOCIALIZATION**		**EXTERNALIZATION**
from			
Explicit Knowledge	**INTERNALIZATION**		**COMBINATION**

Figure 1. Four modes of knowledge conversion.

Source: Nonaka and Takeuchi (1995).

As reflected in Figure 1, is a mode of transferring and sharing experiences and thereby creating tacit knowledge. It is a process where individuals share experiences with each other, which also includes creation and sharing of mental models, world views, and mutual trust (Rai, 2011). Handzic and Chaimungkalanont (2004) propose that socialization is used to enable tacit knowledge to be transferred between individuals through shared experience, space, and time. Mooradian (2005) asserts that tacit to tacit transfer bypasses explicitness completely and goes directly from one mind to that of another or others. Handzic and Chaimungkalanont (2004)

believe that by viewing other person's perspectives and ideas, a new interpretation of what one knows is created. Kermally (2002) proposes that socialization occurs through brainstorming, informal meetings, discussions, dialogues, observation, mentoring, and learning groups. Through social interaction, people may gain highly personal and difficult to formalize knowledge (Girard, 2006).

Nonaka and Takeuchi (1995: 62-63) argue that an individual can acquire tacit knowledge directly from others without using language. Individuals acquire the skills and expertise through observation, imitation, and practice, and the key to acquiring tacit knowledge is experience.

Externalization which is represented by the top-right box in Figure 1 is a mode of articulating tacit knowledge into explicit knowledge. By making tacit knowledge explicit, it can be shared by others and becomes the basis of new knowledge. According to Rai (2011), externalization characterizes the conversion of tacitly held knowledge, such as specialized knowledge held by customers or specialists, into an explicit, readily understandable form. The externalization mode is triggered by meaningful dialogue or collective reflection, in which using an appropriate metaphor or analogy helps team members to articulate hidden tacit knowledge that is otherwise hard to communicate (Morey et al., 2002).

Nonaka and Takeuchi (1995: 64) were of the view that externalization is "a quintessential knowledge creation process in that tacit becomes explicit, taking the shape of metaphors, analogies, concepts, hypothesis, or models". Kermally (2002) believes that externalization occurs through meetings, building hypotheses and models, pictures to communicate, after action reviews, workshops, master classes, assignment databases, best practice exchange, diagrams, illustrations, sketches, metaphors, and analogies all of which play an important role in articulating tacit knowledge, that is normally difficult to express in a verbal or written language.

The conversion process of tacit into explicit knowledge is seen as a process of externalizing individual subjective knowledge into publicly sharable knowledge, with some loss of precision along the way.

Combination which is depicted in the bottom-right box in Figure 1 is a mode of connecting/systemizing concepts into a knowledge system. Combination is the next stage where existing explicit knowledge is articulated, shared, and reconfigured into more complex and systematic sets of explicit knowledge. This process is facilitated by large-scale databases and computerized communication networks (Rai, 2011). Face-to-face communication is not required to transfer this type of knowledge, since this mode of knowledge conversion involves combining different bodies of explicit knowledge, where individuals exchange and combine knowledge through such media as documents, meetings, telephone conversation, or computerized communication networks. Reconfiguration of existing information through sorting, adding, combining, and categorizing of explicit as conducted in computer databases, can lead to new knowledge" (Nonaka and Takeuchi, 1995: 67).

Internalization which is represented by the bottom-left box in Figure 1 is a mode of embodying explicit knowledge into tacit knowledge. The internalization mode is related to the lessons learned from exploitation. Rai (2011: 783) asserts that "the internalization mode is the process where explicit knowledge is embodied and internalized through knowledge interpretation and is converted into tacit knowledge". Kermally (2002) proposes that internalization occurs through facilitation skills, knowledge zones, customer feedback review, and development counseling, and it is closely related to 'learning by doing'.

When experiences through socialization, externalization, and combination are internalized into individuals' tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets. For explicit to become tacit, it helps if the knowledge is verbalized or diagrammed into documents, manuals, or oral stories. Nonaka and Takeuchi (1995: 69) are of the view that "documentation helps individuals internalize what they experienced, thus enriching their tacit knowledge. In addition, documents or manuals facilitate the transfer of explicit knowledge to other people, thereby helping them experience the experiences of others indirectly". As experiences through socialization, externalization, and combination are internalized into individuals tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets (Morey et al., 2002).

The knowledge conversion (SECI) process (Figure 1) is deemed to be the blue print for the knowledge spiral model (Figure 2), where the interaction/dialogue between the modes plays an integral role in knowledge creation and transfer.

Kaiser and Fordinal (2010) identify knowledge creation as a continuous, self-transcending process through which one transcends the boundary of the old self into a new self by acquiring a new context, a new view of the world, and new knowledge. As knowledge creation is referred to as a continuous, self transcending process in the presence of the knowledge spiral – knowledge through this process has an origin however it does not have a conclusion, as it builds on the foundational knowledge that has been created, transferred, and stored in the knowledge conversion process. Arling and Chun (2011) posit that new knowledge is created through the conversion of tacit and explicit knowledge. Rai (2011: 783) believes that instead of progressing in sequential stages, these four modes represent essential components of an optimal spiral of knowledge creation. To validate this assertion, the author cites (Nonaka, 1994: 20) who

states that the knowledge spiral "amplifies knowledge created by individuals and crystallizes it as a part of the knowledge network of the organization".

Arling and Chun (2011) reveal that new knowledge can be created by each mode of the SECI, however, organizational knowledge creation is dependent on the dynamic interaction between the modes – *the knowledge spiral*.
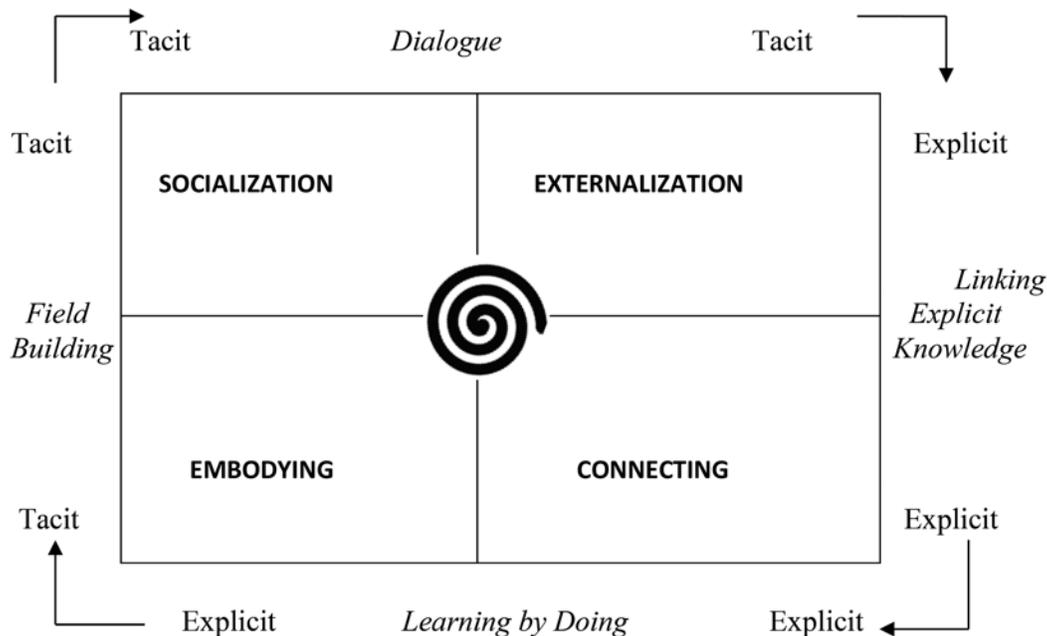

Figure 2. Knowledge spiral.

Source: Adapted from: Nonaka and Takeuchi (1995).

Sandhawalia and Dalcher (2011) also believe that the knowledge spiral processes are dynamic and highly interdependent and intertwined. At any point of time and in any part of an organization, individuals and teams/groups maybe engaged in several different aspects of these knowledge processes. By just being around others, common perspectives develop, and socialization or tacit to tacit knowledge conversion can arise (Nonaka, 1994). Demonstrations can also provide opportunities for the externalization of knowledge as they provide the
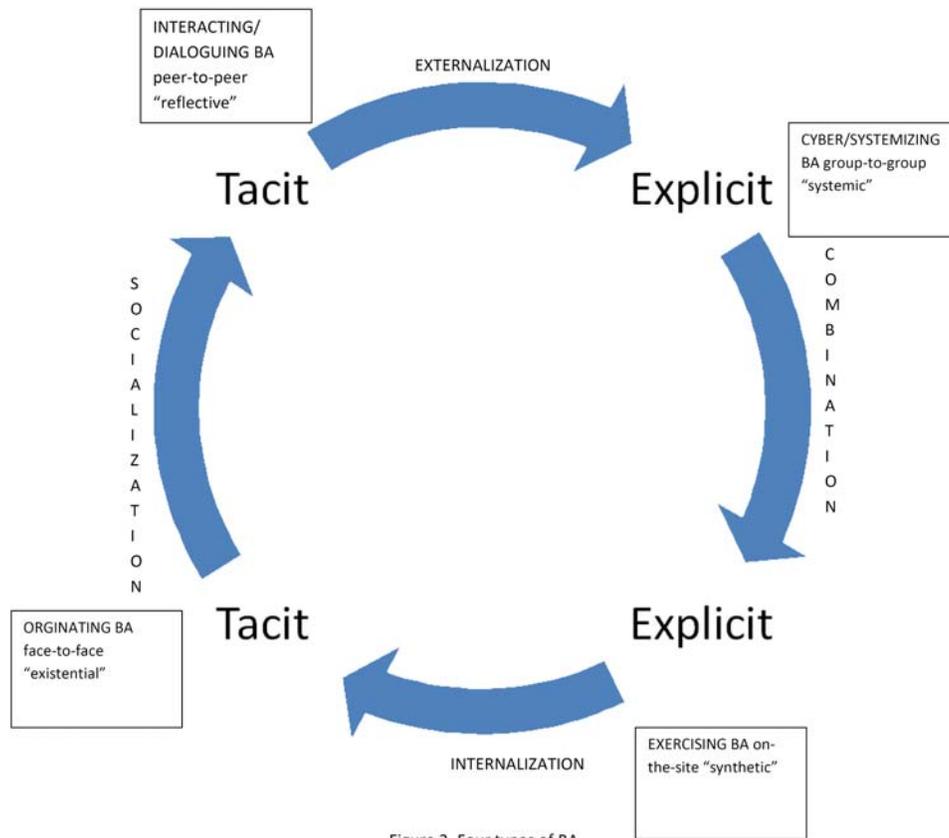
opportunity to convert tacit knowledge to explicit knowledge that is shown to others. Pictures, examples, interpretations, paraphrases and inferences aid in creating relationships and thereby help make tacit knowledge explicit (Arling and Chun, 2011: 234). Knowledge created though the knowledge conversion process triggers a new spiral of knowledge creation, as a result knowledge creation is a spiral process, beginning with the individual and moving up through expanding communities of interaction that in some instances traverse sectional, divisional, organizational, and governmental boundaries (Little et al., 2002; Morey et al., 2002). Knowledge generated within the knowledge spiral is simply put as "from being to becoming" (Nonaka et al., 2000: 8).

The Concept of Ba, Knowledge Creation, and Knowledge Transfer

Kaiser and Fordinal (2010) clearly argue that self-transcending knowledge is the ability to sense the presence of potential, to see what does not yet exist (intuition and hunches), it captures knowledge about the sources or "place" where thought and action come into being, and it is the knowledge about the highest future possibility.

To take advantage of self-transcending knowledge a medium is required, and this medium is the concept of Ba, which is described as a 'space' not just a physical space, but the freedom that allows one to bring hunches, thoughts, notions, intuition, or tacit knowledge into reality. The key idea in understanding Ba is "interaction" among those who share the context, and such interactions consequently results in knowledge creation (Nonaka et al., 2000). There are two dimensions of interactions, namely, one which characterizes whether the interaction takes place individually or collectively, and the other which characterizes whether the interaction takes place through face-to-face contact or virtual media such as books, manuals, e-mails, etc. (Nonaka et al., 2000).

As reflected in Figure 3, Ba is classified into four types on the basis of the dimensions of interactions: originating ba, dialoguing ba, systemizing ba, and exercising ba (Nonaka et al., 2000). While the relationships between each single Ba and conversion mode is not exclusive, each Ba offers a context for a specific step in the knowledge-creation process (Rai, 2011: 783). By reflecting on Nonaka and Konno's (1998) outlook, Choo and Drummond de Alvarenga Neto (2010), explain the significance of Ba in relation to Nonaka and Takeuchi's (1995) knowledge SECI model, and the need for Ba to ensue a continuous interaction between tacit and explicit knowledge, which eventually results in new knowledge or the advancement of pre-existing knowledge. The aforementioned researchers (Choo and Drummond de Alvarenga Neto, 2010) bring a fundamental point to the fore, namely, the difference between "Ba" and ordinary human interaction is the goal of knowledge creation. Nonaka and Konno (1998: 40) consider 'Ba' to be "a shared space that serves as a foundation for knowledge creation".

Figure 3. Four types of BA

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

The "Originating Ba" refers to 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. The "Interacting/dialoguing Ba" is more consciously constructed than the former, and the 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 knowledge is made explicit and dialogue is key for such conversions; extensive use of metaphors.

The "Cyber/systemizing Ba" which is commonly referred to as the place of interaction in a virtual world, is the combination of explicit knowledge, and is most efficiently supported in collaborative environments utilizing IT (online networks, internets, portals, groupware, documentation, and databases). The "Exercising Ba" supports the internalization phase of the SECI model. This Ba is synthetic in that it refers to focused training with a 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 (Choo and Drummond de Alvarenga Neto, 2010: 596-597).

Jakubik (2011) believes that knowledge conversion is a process by which new knowledge becomes available and accessible to the wider organization so that the new idea or insight is expressed, and they allude to Nonaka et al. (2000), who assert that knowledge needs a context to be created, since 'there's no creation without place".

Wang et al. (2011) assert that owing to the importance of knowledge creation capability, its antecedents become a crucial research issue in that it can provide a more complete picture on how organizations, groups, teams, and individuals create new knowledge. Rai (2011) concedes that knowledge is created through a process in which various contradictions are synthesized through dynamic interactions among individuals, the organization, and the environment, and the aforementioned researcher acknowledges that the process of knowledge creation is through a spiral that integrates two seemingly opposing concepts such as ''tacit and explicit, chaos and order, micro (individual) and macro (environment), self and other, mind and body, part and whole, deduction and induction, creativity and control, top-down and bottom-up, bureaucracy and task force, and so forth.

Hautala (2011: 601) explains that interactive knowledge creation that results, for example, in novel ideas, articles and technological applications, is internationalizing along with universities, companies and knowledge-creating groups. Knowledge is being increasingly created in groups, since their capability to innovate and perform complex tasks exceeds that of lone inventors. On the other hand, the exploitation of variety in interactive knowledge creation requires constructing a common understanding and optimal cognitive distance between the group members.

Knowledge Enablers

Al-Alawi et al. (2007) in Suppiah and Sandhu (2011) advocate that trust, communication, information systems/technology, culture, and networks are positively related to knowledge creation and sharing. The aforementioned concepts are commonly referred to as knowledge enablers. Pinho et al. (2012) maintain that people, socio-organizational factors (i.e., rganizational structure plus culture), and information technologies represent crucial knowledge management capabilities affecting knowledge management performance via the mediating role of several knowledge processes (generating, accessing, facilitating, representing, embedding, using, transferring, and measuring).

Xue et al. (2011) explain that trust and dedication are common only when team members communicate effectively. The understanding of a team member's capabilities and competencies will result in a lower level of resistance whilst transferring knowledge.

Monnavarian and Amini (2009: 139) point out that in the knowledge driven economy, "knowledge assets are grounded in the experience and expertise of those individuals working in a company and the firm has to therefore provide the right structures to shape knowledge into competencies. Perez-Araos et al. (2007) emphasize that there is a general acceptance in strategic management literature that networks are a means of transferring and generating knowledge. In

order for a network to exist, collaboration is required to exchange ideas, knowledge and technologies (when sharing knowledge outside of the organization). Organizations and individuals can define formally which knowledge they want to share and which areas they want to protect, to maintain autonomy. A network with excellent knowledge transfer among stakeholders will out-innovate networks with less effective knowledge sharing activities (Carlsson, 2003) and the aforementioned authors believes that social interactions and relationships are fundamental for knowledge management activities.

Information technology is a natural solution to assist with the transfer and storage of knowledge, and more importantly support communication. However, the mere existence of a particular type of technology does not turn a knowledge-hoarding organization into a knowledge-sharing one. Technology can be used as an opportunity to change behaviour, but it has to be introduced carefully, cautiously and in a structured manner (Mohamed et al., 2006: 107). Khandelwal and Gottschalk (2003: 15) admit that the concept of coding and transmitting knowledge in organizations is not new; what is new and exciting in the knowledge management area is the potential of using modern information technologies. The critical role for IT lies in its ability to support communication, collaboration, and those searching for knowledge, and its ability to enable collaborative learning.

Jacobs and Roodt (2011) share the view that organizational culture which is a set of values, beliefs and behaviour patterns that form the core identity of organizations helps in shaping an individuals'/employees' behaviour. Knowledge in the organization is understood in the light of culture, where culture is combined with individual interests and know-how. Du Plessis (2007) argues that there is no detailed outline for the implementation of knowledge management activities due to the fact that each organization's culture is so unique, and therefore what works in one organization may not necessarily work in another organization.

The generation of knowledge in an organization or team is centered on active participation and interaction. Interaction and communication between team members or employees is necessary for the organisation to create a culture, which encourages communication. Sharing knowledge may play a significant role in increasing one's exposure to different ideas and providing different sources of information (Omerzel et al., 2011). Culture, at various levels, is believed to influence the knowledge-related behaviours' of individuals, teams, organizational units and overall organizations because it importantly influences the determination of which knowledge it is appropriate to share, with whom and when (King, 2008).

Liyanage et al. (2009) postulate that several organizations are unaware of the techniques for taking advantage of knowledge, and they may also not know what they know and may also have weak systems to recognise where the ''right'' knowledge is. The lack of an appropriate technical infrastructure for knowledge transfer and transformation limits the ability to spread knowledge to others when the number of individuals allowed to communicate with is limited (Sanchez, 2001). Bukowitz and Williams (2000) argue that the shortcoming of the lack of communication in an organization is that individuals in different parts of the organization, who might conceivably profit from sharing ideas, experience, and expertise, tend to be unaware of one another's efforts. For example, individuals within an organization may possibly go outside their own organizations to seek experience and know-how, whilst unknown to them, the skills and knowledge exist in some other part of the organization (Bukowitz and Williams, 2000).

The culture of an organization may not encourage open communication. Liyanage et al. (2009) assert that since communication comprises of a source and receiver, they advise that the knowledge conversion model introduced by Nonaka and Takeuchi (1995) also be used in this process model to describe different modes of knowledge transfer.

Socialization is a great example for informal modes where individuals or teams have unscheduled meetings, friendly discussions, etc. However, such mechanisms may involve certain amounts of knowledge waste due to an absence of a formal recording of knowledge. Formal transfer mechanisms appear to be more effective than informal mechanisms although, according to Alavi and Leidner (2001), it may inhibit creativity and innovation. Communities of practice facilitate knowledge transfer between individuals within an organization. O'Sullivan (2007) believes that a community of practice is designed to enable users within a group who come together to learn and share knowledge, to either communicate face to face or virtually. Because of the nature of this communication, the individuals apart of the community have the ability to deal with communications on a group basis rather than on an individual basis with the advantage of time saving and clarity (O'Sullivan, 2007).

Conclusion and Recommendations

The study of knowledge management and its associated processes is prevalent in every field of study; knowledge is developed from the notions, hunches, thoughts, and ideas of human beings. Knowledge in nearly every field of study is in a state of evolution or has the potential to evolve, and as niches are exploited, knowledge evolves, and so do individuals' beliefs and perceptions. It became apparent for the discussion that knowledge generation is not centered on artificial intelligence but on interaction. The pioneers of knowledge management literature Polanyi (1966) and Nonaka and Takeuchi (1995) have been catapulted knowledge management into the limelight over the past decade, since their discourse is prevalent in the majority of academic journals used in the literature review for this paper. What emerges from this conceptual study is that in today's knowledge driven economy, collaboration, socialization, and information on demand, are the hallmarks of knowledge creation and transfer. The more information we

collect, the more we learn, as a result we have access to more knowledge, which enables us to create new knowledge or improve the existing knowledge-base.

Knowledge networks and a knowledge-based culture can almost guarantee that knowledge is converted according to Nonaka and Takeuchi's (1995) knowledge (SECI) spiral model. However, in today's technologically driven atmosphere, knowledge creators require suitable technical infrastructure is to support their knowledge creation, and transfer activities. The transfer of tacit knowledge is by no means a voluntary action, as there is need to build networks and trust among the individuals in the network built. Through socialization, the willingness to share and/or use tacit knowledge, the knowledge network is developed.

Through providing an exploratory conceptual understanding of the general knowledge creation and transfer process, this paper demonstrated that understanding if appropriately applied, the process could hold organizations in good stead and place them at the forefront of innovation and help them gain a competitive advantage. What seems to be missing in the literature review though is the application of theoretical process conceptualized in this paper, to practical situations, such as by research post-graduate students. Post-graduate students together with their supervisors/study leaders/advisors engage in knowledge 'co-creation', however little is known about their process of knowledge creation, conversion, and transfer. Furthermore, much of the products/outputs (theses and dissertations) of post-graduate studies is not 'converted' or 'commercialized', which defeats the very purpose of knowledge. Thus, researchers need to apply the process conceptualized in this theoretical study to various situations in order to better understand the importance of knowledge.

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