

# Applying the knowledge creation model to the management of indigenous knowledge research

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## Abstract

*In present-day society, the need to manage indigenous knowledge is widely recognised. However, there is a debate in progress on whether or not indigenous knowledge can be easily managed. The purpose of this paper is to examine the possibility of using knowledge management models like knowledge creation theory in the management of indigenous knowledge. The paper defines knowledge creation as a process that stems from accumulating information, while knowledge transfer refers to “the transfer of knowledge to places and people, where it is needed to be used to fulfil some activity or task”.*

*This paper presents the literature which was used to review and to explore previous studies in the IK and knowledge creation Model (KCM) particularly on the possibility of using knowledge creation theory to inform the management of indigenous knowledge. Despite criticism of KCM, the model/theory can potentially be applied to link tacit and explicit knowledge and by extension IK through four modes of the knowledge creation: socialisation, externalisation, combination and internalisation as revealed in the wide use of the model in knowledge management in society and organisations.*

**Keywords:** Knowledge creation theory, indigenous knowledge, ICTs, knowledge management.

## Introduction

Nowadays, organizations and communities recognize the importance of managing tacit indigenous knowledge using knowledge management models. This is elaborated by Ngulube (2003) who states that encoding indigenous knowledge into information is one of the keys to its successful management. This raises a lot of debate; for instance, how do we capture tacit indigenous knowledge? How do we preserve and disseminate IK? As indicated by Ngulube 2003, these questions are not easily answered but can be partly addressed by knowledge creation theory. This paper was informed by Nonaka's (1994) knowledge creation theory on the possibility of managing tacit knowledge such as indigenous knowledge.

This paper starts by throwing light on the concept theoretical framework. Firstly, it is widely understood that the road map of any research or scientific project should be based on theory or a theoretical framework. Kumar (2014: 67) views a theory as a set of systematically interrelated concepts, definitions, and propositions that are advanced to explain and predict facts. Kumar adds that a theory can be explained or defined by the framework of assumptions and concepts in which it is embedded. Khan (2010) notes that a theoretical framework serves to guide a researcher in his or her investigation in a broad field of expertise by expounding on an underlying principle, rationale or foundation with respect to the research topic. Neuman (2000: 59), on the other hand, construes theoretical frameworks as providing collections of assumptions, concepts, and forms of explanation. Awang (2011) explains that a theoretical framework is a systematic diagram showing how the research believes the variables should relate to each other. According to Ocholla and Le Roux (2011), a theoretical framework is objectively geared towards enhancing clarity, appropriateness and effectiveness in research. The two authors define a theoretical framework as that part of a research proposal or study that sets out to describe the research question (hypothesis) and the line of inquiry and methodology used to answer it. For Ocholla and Le Roux (2011), a theoretical framework refers to the agenda, outline, and theoretical construct of a research approach and normally precedes a literature review. Thus, concepts and constructs are used at a theoretical level while

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variables are used at the empirical level as explanations or interventions. As such, theories are generalizations about variables and the relationships between them.

The concerns of this paper lie with indigenous knowledge management and a framework that can be used to share and document it for future generations. The objectives of the study required a theoretical framework that has components of knowledge creation and knowledge management. The Knowledge Creation and/or Transfer theory, commonly known as Nonaka's theory, was identified as the most suitable framework for managing tacit indigenous knowledge. This theory can potentially be applied to four modes of knowledge creation and/or transfer; that is, socialisation, externalisation, combination and internalisation (Nonaka 1991). Nonaka (1997) argues that the strength of the theory lies in recognizing, generating, transferring and managing tacit knowledge across time and space. In other words, knowledge creation is predicated on building both tacit and explicit knowledge and the interchange between them through internalisation and externalisation. The four modes of knowledge creation are briefly explained as follows: the process of tacit to tacit transfer is called socialisation. In this regard, experiences, ideas and skills are shared. Tacit to explicit transfer is called externalisation. In this process, ideas and narratives are transformed into formats that may be transmitted easily. Moreover, combination as the third element is known for explicit to explicit transfer. This is achieved when combining different sets of explicit knowledge using, for example, databases and web-based tools. The last one is internalisation which is explicit to tacit transfer. It is learning by observation and from face-to-face meetings (Nonaka 1994). For Nonaka, knowledge creation theory has been widely applied in organizations to manage knowledge. Bratianu and Orzea (2010) posit that in a knowledge creating firm, knowledge is created through dynamic interactions with the environment. With the above in mind, this paper examines various indigenous knowledge management theories and focuses on the applicability and relevance of the knowledge creation theory.

### **Indigenous knowledge management theories**

Ocholla and Le Roux (2011) observe that Library and Information Science research is informed by a number of theories (see [www.is.theorize.org](http://www.is.theorize.org)), most of which originate from other disciplines. Previous research on indigenous knowledge management has been informed by several of these theories, including but not limited to:

The Three Knowledge Facets (Yang 2003) or holistic learning theory, which defines knowledge as a construct with three distinct and interrelated facets – implicit, explicit, and emancipatory knowledge;

Earl's model (Earl 1989), which concentrates on the stages through which organisations pass in planning their information systems. The theory was revised a number of times, first in 1983 and undergoing revisions in 1986, 1988, 1989, and 2001;

Social Cognitive Theory (SCT) (Bandura 1977), which examines the processes of cognitive experiences and values in the assessment and/or judgement of individuals;

The Three Pillars of Knowledge Management by Wiig (1997). Wiig's framework is based on three pillars and the foundation of KM. KM, as it is referred to here, is the way knowledge is created, used during problem solving and decision making, and manifested cognitively as well as in culture, technology and procedures. The three pillars are: the exploration of knowledge, its value assessment, and its active management;

Information-Space Model. Boisot (1998) proposes that individual knowledge is the sum of our mental models and through these mental models we process data and information to bring about actions and change; and

Knowledge Creation Theory (Nonaka 1994), which deals with four components, namely socialisation, internalisation, combination and externalisation. This theory is used in organizations to manage knowledge.

Evidently, the theories are diverse and would be very difficult to address at the same time. Their diversity and degrees of appropriateness makes it possible for researchers to apply them in different

contexts depending on the research topic and their perceived relevance. In the next section, the knowledge creation theory is discussed.

### **Knowledge creation theory**

Nonaka (1994) defines knowledge creation as the process that stems from accumulating information, while knowledge transfer refers to “the transfer of knowledge to places and people, where it is needed to be used to fulfill some activity or task”. Knowledge essentially stems from belief, skills and experience. Nonaka (1997) conceptualizes knowledge creation in terms of two types of knowledge: tacit knowledge and explicit knowledge. Bennet and Bennet (2008) are of the view that tacit and explicit knowledge are not mutually exclusive entities. They further argue that people cannot truly understand without experience. In other words, unless one tries to convert tacit knowledge into explicit knowledge, one cannot reflect upon and share it organizationally or in a community. Additionally, through the dynamic interaction between the two types of knowledge, personal knowledge becomes organizational and/or community knowledge.

Notably, tacit knowledge is considered as personal, context specific, embedded in individual experience, difficult to communicate, and shared within the community and organization (Nonaka & Von Krogh 2009; Aman & Nicholson 2003). Thus, it has to be converted into words or numbers that others can understand. Tacit knowledge is essentially uncoded knowledge that is not easily visible and expressible. It is argued that tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or share with others (Mir & Rahaman 2003; Nonaka & Von Krogh 2009). A study by Nonaka and Von Krogh (2009) in particular, considers tacit knowledge as a cornerstone in organizational knowledge creation theory and covers knowledge that is unarticulated and tied to the senses, movement skills, physical experiences, intuition or implicit rules of thumb. Explicit knowledge, on the other hand, is easily communicated and shared. For Nonaka and Von Krogh (2009), explicit knowledge is uttered and captured in drawings and writings. Mir and Rahaman (2003) refer to explicit or codified knowledge as knowledge that is transmittable in formal, systematic language. Mir and Rahaman further explain that explicit knowledge can be expressed in words and numbers, and easily communicated and shared in the form of hard data, scientific formulae, codified procedures, or universal principles.

It is therefore in this sense that knowledge creation encompasses tacit knowledge and explicit knowledge (Nonaka and Konno 1998). Nonaka (1997) argues that unless people try to convert tacit knowledge into explicit knowledge, they cannot reflect upon and share it organizationally. However, through this dynamic interaction between the two types of knowledge, personal knowledge becomes organizational knowledge.

Nonaka and Konno (1998) further point out that the interaction between the two types of knowledge brings about four modes of knowledge conversion: socialisation (from individual tacit knowledge to group tacit knowledge), externalisation (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge), and internalisation (from explicit knowledge to tacit knowledge). These modes of knowledge creation are theories of Nonaka’s in managing the tacit and explicit knowledge of an organization. Nonaka (1994) argues that tacit knowledge in an organization is acquired mainly through the socialising and externalising skills and experiences of employees for the benefit of the organization. This means that the tacit knowledge of employees is captured, preserved and disseminated to be used by the organization to increase its production. In that regard, the process of the four modes of knowledge conversion is thoroughly explained in the following diagram.

### **Articulating key elements of the knowledge creation theory**

The four elements of knowledge creation, as pointed out by its founder Nonaka (1994), are illustrated in the figure below.

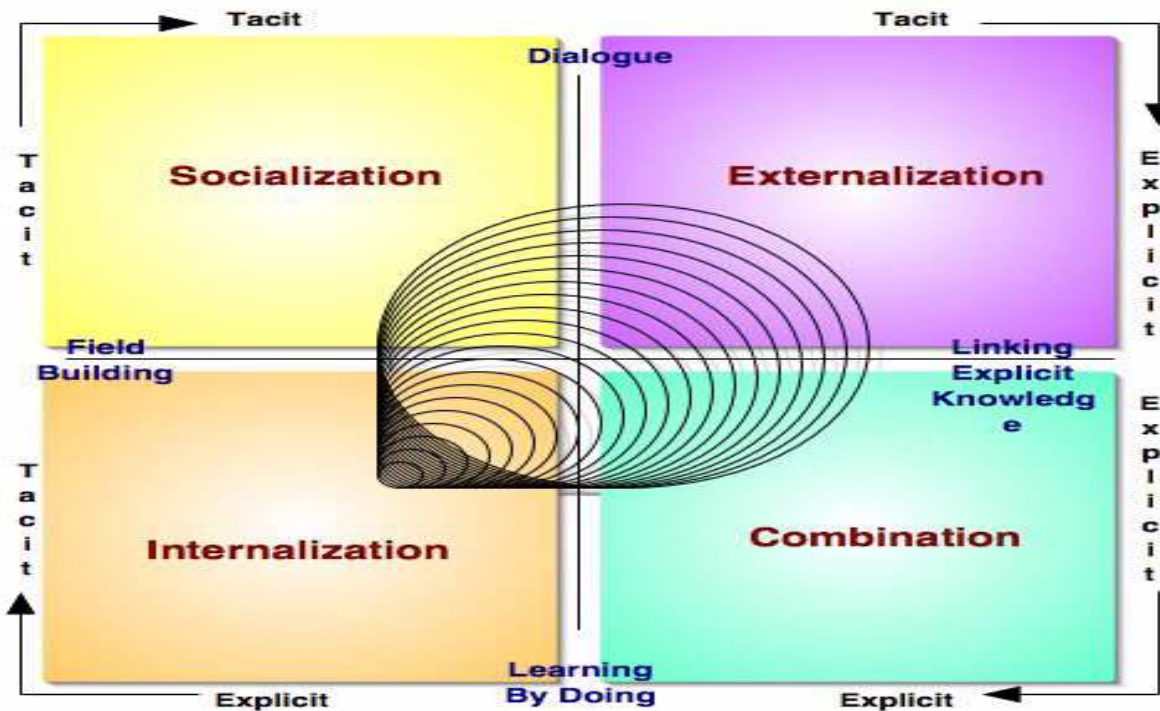


Figure 1: Key elements of the knowledge creation theory  
(Source: Nonaka 1994)

## Discussion of the four elements of the knowledge creation theory

### Socialisation

Nonaka (1994) defines socialisation as the process of creating common tacit knowledge through shared experiences. In order for socialisation to be effective, people need to build a 'field' of interaction, where individuals share experiences and space at the same time, thereby creating common unarticulated beliefs or embodied skills. As such, socialisation yields new tacit knowledge that is built through informal interaction, that is through the exchange of tacit knowledge (Hoegl & Schulze 2008; Marley 2012). Nonaka and Konno (1998) explain that tacit knowledge that cannot be formally articulated between individuals may be exchanged through joint activities. This may involve being together for some time or living in the same environment, which allows newcomers to understand others' ways of thinking, skills, feelings, and experience. Mosoti and Masheka (2010) emphasize that during socialisation the conversion is tacit to tacit (for example watching somebody doing something, then copying it). Socialisation, according to Bratianu and Orzea (2010), is an opportunity for participating individuals to share their experiences and to learn through the direct exchange of tacit knowledge. Hemmecke and Stary (2003) and Holmqvist (1999) assert that knowledge sharing within communities is embedded in their practices, which is considered to be tacit knowledge. In that regard, Holmqvist (1999) and Marley (2012) argue that experience is the primary driver of this form of knowledge conversion. This kind of knowledge sharing among communities corresponds with the process of socialisation.

It is argued by Hemmecke and Stary (2003) that knowledge sharing within and between communities only occurs when the socially embedded tacit knowledge is at least partly converted into explicit knowledge. Nonaka and Konno (1998) are of the view that this is the process of transferring one's ideas or images directly to colleagues or subordinates in sharing personal knowledge. In this process, individuals share feelings, emotions and experiences, and this removes barriers and increases trust and commitment (Nonaka & Konno 1998). According to Nonaka and Konno (1998), in order for socialisation to take place, individual people should share face-to-face experiences, which then makes it possible to transfer tacit knowledge. Clark (2004) concurs with Nonaka and Konno (1998), adding that socialisation includes

observation, imitation, and practice. Clark thus concludes that sharing experiences is the key, which is why the mere transfer of information often makes little sense to the recipient.

It is emphasized that the effectiveness of the socialisation process depends on the organizational culture and the balance between individual competition and group cooperation. Moreover, it is emphasized that socialisation must go beyond the everyday dialogues and exchange of neutral phrases. In other words, it must stimulate deeper layers of experiences and stored knowledge (Bratianu & Orzea 2010; Holste & Fields 2010; Marra 2004). In order for socialisation to be effective, Hong (2010) suggests spending prolonged hours every day attending social events and working under a team structure, and developing a close and enduring working relationship with other colleagues. It can therefore be deduced that the company is not only a place of work but also a coherent social community with profound emotional attachments and common identity. In other words, it is a place where hidden knowledge is shared among employees who might be interested in increasing their knowledge and learning new skills. As argued by Nonaka and Konno (1998) tacit knowledge can only be shared if the self is freed to become the larger self, that includes the tacit knowledge of the other.

### **Externalisation**

The second knowledge creation element is externalisation (Nonaka 1994), defined as the conversion of tacit knowledge into explicit knowledge (Bratianu and Orzea, 2010; Marley 2012; Nonaka 1994). According to Nonaka and Konno (1998); Clark (2004), the process of externalisation is supported by two key factors: the conversion of tacit knowledge into explicit knowledge that involves techniques to help express one's ideas or images as words, concepts, figurative language (e.g. metaphors, analogies or narratives) and visuals, and translating the tacit knowledge of customers or experts into readily understandable forms.

A study by Scharmer (1996) regards externalisation to be the process of articulating tacit knowledge into explicit knowledge as concepts and/or diagrams, often using sketches. The advantage of externalisation, according to Marley (2012), is that it makes tacit knowledge transferable to others, and makes it useful and applicable in a wider context. Authors such as Nonaka and Konno (1998), Mosoti and Masheka (2010), and Marley (2012) consider externalisation to be the conversion of tacit knowledge to explicit knowledge (that is, doing it and then telling it). Bratianu and Orzea (2010) note that once the knowledge becomes explicit, it can be shared, disseminated, and transferred to others through verbal and non-verbal language. However, Nonaka (1997) adds that dialogue is an important means of exchanging ideas in externalisation. For instance, during face-to-face communication, people share beliefs and learn how to better articulate their thinking through instantaneous feedback and the simultaneous exchange of ideas. However, Hemmecke and Stary (2003) regard externalisation to be the method of converting implicit knowledge into tangible knowledge. They argue that it is not usually acknowledged that the vocalisation of intangible knowledge is really possible. On the other hand, Nonaka and Konno (1998) and Marley (2012) are of the view that the results of the externalisation process enable people with different backgrounds to share gained or acquired tacit knowledge.

According to Marley (2012), tacit knowledge needs to be codified and converted into an understandable format, such as words or images. It is further indicated that some technologies, such as groupware, databases, radio, television, the Internet, flash drives and many others, assist in the externalisation of tacit knowledge. It is worth noting that this is an area where ICT tools are applied to safeguard traditional knowledge for future use. Finally, the methods of externalisation entail capturing the personal, historical, social and material contexts of knowledge, including both the individual and collective work practices. It also involves being adaptable to and reflecting the dynamics of knowledge in work activities and in various organisational settings, in particular between communities and various stages of knowledge-management maturity. A study by Bratianu and Orzea (2010) concluded that externalisation reduces the entropy of total knowledge by structuring and integrating new created knowledge into the existing explicit knowledge structures. The following discussion involves that combination.

### **Combination**

Nonaka (1997), Sarayreh, Mardawi and Dmour (2012) assert that once knowledge is explicit, it can be transferred as explicit knowledge through a process that the authors refer to as 'combination'. Nonaka (1994), Scharmer (1996) and Bratianu and Orzea (2010) define combination as the process of assembling new and existing explicit knowledge into systematic knowledge, such as a set of specifications for the prototype of a new product. Combination is the process of converting tangible knowledge into more multifaceted sets of tangible knowledge (Nonaka & Konno 1998). Nonaka and Takeuchi (1995), Mosoti and Masheka (2010) and Marley (2012) are of the view that the combination of new explicit knowledge with existing information and knowledge generates and systematises explicit knowledge throughout the organisation. They identify three important phases of the conversion process, namely: capturing and integration, dissemination, and editing and processing.

In a study by Marley (2012), it is noted that capturing and integrating involves collecting essential data from both internal and external sources and combining data or knowledge. During dissemination, new knowledge is spread and shared amongst members. This can be achieved in various ways, for example, during presentations or meetings. Lastly, during the editing and processing phase, the knowledge that has been created is made explicit in the form of documentation, which is then put through a process of justification. In order for the knowledge to be justified, it needs to correlate with the knowledge vision of the organisation. According to Nonaka and Konno (1998), the aforementioned process makes information concrete and useful.

According to Nonaka (1997) and Sarayreh, Mardawi and Dmour (2012), combination is where information technology is most helpful because once tacit knowledge has been converted into explicit knowledge, it can be conveyed again through documents, e-mails, databases, as well as through meetings and briefings. Nonaka and Konno (1998) add that mechanisms for explicit knowledge conveyance include the use of on-line networks, group-ware, documentation and databases for storing valuable assets. Thus, a newly created concept is combined with existing knowledge to materialise it into something tangible.

Combination, according to Nonaka (1997), allows not only for knowledge transferral among groups across organisations, but also for the collection of relevant internal and external knowledge towards dissemination, editing and processing, in order to make it more usable and accessible to the organisation. It has been argued by Marley (2012), that the combination of external and internal knowledge is facilitated or triggered by coordinating teams and their activities, as well as by means of the documentation of existing knowledge. The next step under discussion is internalisation.

### **Internalisation**

Nonaka (1994) considers the fourth element in the knowledge creation theory to be internalisation. Internalisation, according to Nonaka and Konno (1998), Marley (2012), and Sarayreh, Mardawi and Dmour (2012), involves the conversion of explicit knowledge into tacit knowledge that is shared at an organisational level. During internalisation, individuals identify and acquire explicit knowledge that is created during the externalisation and combination phase. This knowledge is then explored by means of practice, following which individuals acquire and understand the tacit dimension of this knowledge (Nonaka & Konno 1998; Marley, 2012). It is argued by Nonaka (1997), that knowledge in its personal form is demonstrated by only its owner. In that regard, Bratianu and Orzea (2010) posit that the advantage of internalised knowledge is that it increases the level of individual understanding and absorptive capacity.

Authors such as Clark (2004), Hong (2010), and Sarayreh, Mardawi and Dmour (2012) concur with Nonaka (1997) by regarding internalisation as the exchange of explicit knowledge with tacit knowledge. Clark (2004), in particular, clarifies that internalisation is learning by doing. Likewise, Marley (2012) and Nonaka (1994) emphasise that internalisation is generated by "learning by doing or using". This means that tangible knowledge that is documented as manuscripts, sound, or in video format, enables the internalisation process. Therefore, booklets, a quintessential example of tangible knowledge, are broadly used for internalisation. Sarayreh, Mardawi and Dmour (2012) conclude that internalisation is

largely experiential and that it actualises concepts and methods, either through the actual doing or through simulations.

To summarise, internalisation is the process of understanding and absorbing explicit knowledge into the tacit knowledge held by an individual. In the process of internalisation, the experiences of experienced workers in an organization are transferred to the tacit knowledge of the individual. Additionally, knowledge in its tacit form is actionable by the owner while others are observing.

### **Critique of Nonaka's theory**

There has been some criticism of this theory. For instance, Andriessen and Boom (2007), Glisby and Holden (2003), Bratianu and Orzea (2010), Harsh (2009), Lwoga and Ngulube (2010), and Ngulube (2003) reveal that Nonaka's model has various shortcomings. Glisby and Holden (2003), for example, argue that Nonaka's knowledge-creating theory has been indiscriminately applied across contexts and cultures as inherently superior to other systems of knowledge management. However, while Nonaka's model of knowledge dynamics in organisations can be very well understood and used in the context of Japanese culture, it is unlikely to produce successful results in other cultures (Bratianu, 2010; Gourlay 2006; Kaplan, 2008; Snowden 2007). The basic cornerstone is the concept of *Ba*, which can hardly be understood in a culture where the Cartesian dualism has produced such a gap between rational and non-rational worlds (Bratianu 2010:195).

Snowden (2007) also considers Nonaka's knowledge creation theory as only relevant in the Japanese context, and states that it cannot be applied in a different setting. The author laments that implicit knowledge and explicit knowledge are dimensions which cannot be transformed from one form to the other. Andriessen and Boom (2007) and Harsh (2009) likewise argue that the Eastern knowledge perspective is very different from the Western. The three authors provide an example of the Western perspective where emphasis is placed on explicit knowledge, while in the Eastern perspective the emphasis is put on tacit knowledge. This is an indication that people from different cultures differ widely, and their methods of communication may not be the same, due to the influence of culture.

The four processes of knowledge creation have also been heavily criticised. For instance, Bratianu (2010) postulates that by integrating the four basic processes of knowledge dynamics, namely socialisation, externalisation, combination and internalisation, into a pattern of knowledge conversion, Nonaka is blurring the lines between individuals and groups. The author asserts that according to the epistemological dimension (Nonaka 1994; Nonaka and Takeuchi 1995), knowledge conversion – from tacit to explicit and from explicit to tacit – is clearly a process developed at the individual level. Bratianu (2010) is of the view that there is no reason for such a process to be developed between the tacit knowledge of a given person and the explicit knowledge of another person. He argues further that if the entire spiral of knowledge creation were to be limited to only two individuals, it could perhaps be understood. However, the author posits that if we consider a group of people, it is difficult to explain and demonstrate how knowledge conversion works, because of the sequential interplay between strictly individual processes and group processes.

In discussing the four modes of knowledge creation between tacit and explicit, Nurse (2001) argues that what the knowledge creation theory lacks is the context of the process and the kind of knowledge it is envisaging through this process. The author believes that the knowledge creation theory has failed to describe how the conversion of knowledge leads to the creation of new knowledge. This raises the question of whether having knowledge transferred between one person and another is, in fact, knowledge creation.

According to Gourlay (2003), while many authors and writers acknowledged Nonaka for recognising that the capacity for corporate action depends on ideas and beliefs as much as on scientific knowledge, Gourlay concluded that his subjectivism tended towards a dangerous relativism because he made justification a matter of managerial authority, and neglected to consider how scientific criteria relate to corporate knowledge. In the study by Gourlay (2003), Nonaka's theory does not clarify how fresh ideas

are formed, nor how deep understanding (necessary for expertise) develops. The author perceives Nonaka's model of knowledge creation to be unconvincing, and claims that it makes collaborative work a mystery.

A theory, according to McLean (2004), must be clear and precise if it is to be understandable, internally consistent, and free from ambiguities. In other words, a good theory must have precision and clarity. For McLean (2004), in the operational phase, Nonaka's model must be interpreted, or transformed to noticeable, provable components or elements. The author argues that knowledge creation theory is very difficult to understand due to the relatively abstract nature of the subject matter. Thus, it is understandable why the concepts included in the theory are difficult to operationalise. For him, the authors of the knowledge creation theory attempt to operationalise the concepts through case examples, conceptual models, and general statements about it. The author posits that many of the concepts are somewhat abstract, leading to a certain amount of ambiguity. McLean emphasises that the work to operationalise this theory appears to lack explicit, testable hypotheses that would show how the concepts relate to each other beyond these general statements.

However, McLean (2004) admits that Nonaka's theory was able to identify and describe the knowledge creation process through concepts such as modes of knowledge conversion, conditions for knowledge creation, and levels in the process. In doing so, Nonaka made this process easier to understand. Therefore, while the theory has cultural and other criticisms leveled against it, there is still considerable potential in the application of knowledge creation theory to the management of indigenous knowledge. Ngulube (2003) emphasised the need to adopt knowledge management theories; such as knowledge creation (KC) as a tool for managing indigenous knowledge that is embedded in rural communities of developing countries. In that regard, the following section is a discussion of how knowledge creation theory has been applied by previous studies and the current study in the management of indigenous knowledge.

### **Application of knowledge creation to the management of indigenous knowledge**

The first part of this section looks at how other studies applied knowledge management theories like knowledge creation in the management of indigenous knowledge. We have used some of examples of studies conducted in this context in Africa which include Lwoga (2009); Marley (2012) and Ngulube and Lwoga (2007), just to mention a few.

Lwoga (2009) used Nonaka's theory in her study entitled "Understanding indigenous knowledge: Bridging the knowledge gap through a knowledge creation model for agricultural development knowledge". She applied knowledge creation theory which encompasses socialisation, externalisation, combination and internalisation and allows interaction with each other to create knowledge. The findings revealed that socialisation was effective among farmers where new knowledge is created through interactions, group meetings and observations. Externalisation was also useful among farmers where carvings which included toys, drawings from clay pots, utensils, etc. were used in externalising their tacit knowledge into explicit knowledge for the benefit of the community. On the other hand, combination was also useful because they shared their explicit knowledge with others through village meetings, group interactions as well as in print formats and ICTs such as cellphones and emails. Lastly, internalisation showed that even though explicit knowledge was available on ICTs, the findings showed that farmers were receiving information from tacit sources compared to explicit sources of knowledge. Lwoga (2009) concluded that some knowledge management theories like knowledge creation were applicable in the management of indigenous knowledge in rural areas.

Marley (2012), applied Nonaka's theory in a study entitled, "Investigating the appropriateness of the theory of organisational knowledge creation as a management model for practice-led research". Marley (2012) also used knowledge creations which proved to be useful tools in practice-led research.

Ngulube and Lwoga (2007) used Nonaka's theory in their study entitled, "Knowledge management models and their utility to the effective management and integration of indigenous knowledge with other



knowledge systems". The authors emphasized the possibility of using knowledge management models like knowledge creation theory in the management of tacit indigenous knowledge. Additionally, it was evident in their study that there is a need to utilize knowledge management models in the management and preservation of indigenous knowledge. Their findings gave us confidence that it is possible to manage indigenous knowledge using selected knowledge management theories like knowledge creation.

Ultimately, tacit indigenous knowledge needs to be managed because it is at risk of becoming extinct if appropriate measures are not taken to preserve and manage it. According to Lwoga, Ngulube and Stilwell (2010), IK needs to be managed by using knowledge management theories because much of IK is preserved in the memories of elders, thus gradually disappearing due to loss of memory and death. Mosoti and Masheka (2010) sum up the drive to manage knowledge in African culture with an old African proverb that states, "In Africa, when an old man dies, the entire library is burnt." In this sense, knowledge management models, such as knowledge creation, can be used to manage and share IK in communities that recognize its relevance and its importance. Authors such as Eftekharzadeh (2008), Lwoga and Ngulube (2008), Marley (2012), Mosoti and Masheka (2010), and Ngulube and Lwoga (2007) recognize that knowledge management models can be useful strategies for managing and integrating IK into other knowledge systems. These frameworks provide the possibility of creating knowledge that is relevant to local communities. Mosoti and Masheka (2010) add that there is a need in Africa to capture tacit indigenous knowledge and share and transfer it by networking between countries. However, Ngulube (2003) argues that tacit indigenous knowledge should not be separated from the individuals who possess it. He suggests that efforts should be made to enable the communities to innovate, create, and manage their own knowledge and to adapt other knowledge systems for a sustainable variety of indigenous knowledge practices like agriculture, medicine, artwork, etc. In this regard, knowledge management models such as the knowledge creation theory provide an opportunity to manage but not alter tacit indigenous knowledge.

## Conclusions

We note that the Knowledge Creation (KC) model can be appropriate for IK management, which is confirmed by various studies that have used the theory in IK research investigations. The four elements of KCM namely socialisation, externalisation, combination and internalisation seem to fit well, largely for tacit knowledge management such as indigenous knowledge. Thus these four elements of knowledge creation are also fundamental to exchanging knowledge, not only within organisations, but also in the affairs of life. Further, despite the criticism of this theory, it is still widely applied in recent studies as discussed in previous sections. The criticism – though – define the gaps in the application of the theory worth noting for future research. This article contributes to the increasing reviews of IK and KCT that are essential for advancing IK research, including a recent PhD study by this author (Dlamini 2016) in which theory, methodology and findings are discussed in detail and disseminated widely (<http://uzspace.uzulu.ac.za/handle/10530/1563>; Dlamini 2017)

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