Harnessing Community’s creative expression and indigenous wisdom to create value.

Tacit-Implicit-Explicit (TIE) Knowledge Creation Model.

Tariq Zaman.  
Faculty of Computer Science and Information Technology,  
Universiti Malaysia Sarawak,  
94300 Kota Samarahan, Sarawak, Malaysia  
tariqzaman@lawyer.com

Alvin Yeo Wee  
Institute of Social Informatics and Technological Innovations (ISITI-CoERI)  
Universiti Malaysia Sarawak,  
94300 Kota Samarahan, Sarawak, Malaysia  
alvin@fit.unimas.my

Narayanan Kulathuramaiyer  
Faculty of Computer Science and Information Technology,  
Universiti Malaysia Sarawak,  
94300 Kota Samarahan, Sarawak, Malaysia  
nara@fit.unimas.my

ABSTRACT

Knowledge creation process in indigenous communities is a less focused but important area of research. We proposed the Tacit-Implicit-Explicit (TIE) model to conceptualize the information and know-how engagement process with indigenous communities. The model is an extension of traditional knowledge creation model. It will provide an insight of the flow and absorption of new information and know-how in indigenous communities and will describe that on the base of new information, how the community flourishes innovation and knowledge creation? A case study of Barito-Buayan community information exchange and knowledge creation is presented while the research is still in progress to collect more case studies from communities and to validate the model.

Keywords  
Indigenous Communities, Knowledge Creation, TIE model.

INTRODUCTION

Indigenous knowledge management system (IKMS) is a living model that describes the processes of creation, adaptation, accumulation and utilization of community’s collective or individual’s experiences, whether it resides in practices, customs, and traditions or in individuals’ heads (1). Knowledge creation is the first stage in the indigenous knowledge management cycle. The knowledge creation concept is often associated with organizations and less focused and less studied from indigenous communities’ context and perspective. This can be due to the fact that the majority of IK [Indigenous Knowledge] resources are not published in academic journals (2), or that knowledge creation in communities are not well pictured and documented. The scientific community and organisations have focused on indigenous knowledge management as a management of corpus of facts rather than management of and by a living system. IK (Indigenous Knowledge) as a living system facilitates a much broader understanding of an indigenous community and system; as communities place themselves in relation to the environment in which they live (3). This paper is an attempt to focus on knowledge creation component to highlight the “living” characteristic of IKMS. The objective would be achieve by exploring the knowledge creation processes on the base of information and know-how flow inside indigenous communities, so we restrict our focus to knowledge creation in general and in indigenous communities in particular.

LITERATURE REVIEW

Knowledge creation:

Knowledge creation, also called knowledge production (4), or knowledge construction (5). It is arguably the most important step in knowledge management processes, as the management (control) of knowledge is impossible without first creating it (6). 

The creation of knowledge refers to creating new knowledge, not merely learning what another person already knows or acquiring knowledge from the outside (7). The knowledge creation process involves such steps as sharing tacit knowledge, creating concepts, justifying concepts, building a prototype, and cross-leveling the knowledge (8). Through social and collaborative processes as well as an individual’s cognitive processes (e.g., reflection), knowledge is created, shared, amplified, enlarged, and justified in organizational settings (9).

Much of the existing research on knowledge creation focuses on the source and state of knowledge. Research is now needed to moves beyond the traditional approach and to consider the factors that facilitate knowledge creation i.e. enabling environment, culture communities’ capacity and process of engagement with new information and know-how. The process of engagement of community with information would be discussed in next sections. In modern organizational structures the culture has been identified as one of the most important conditions leading to the success of KM initiatives in organizations (10).
In organizational context knowledge creation and development of knowledge creation models is a well-established practice. There are many organizational knowledge creation conceptual models in which we will review three famous models, SECI model proposed by a Japanese social scientist I. Nonaka, Rachel Bodle’s model for mobilizing tacit knowledge, and Jackson and Klobas model of knowledge transfer and creation.

SECI or “ba” model of knowledge creation

In Nonaka’s theory, knowledge conversion or interaction is the key concept. How to enable or facilitate the interaction? In spite of those proposed conditions or enablers, Nonaka emphasized a Ba during enabling process. “Ba”, a Japanese word, is defined as a platform where knowledge is created, shared, and exploited. Ba can be physical, virtual, mental or any combination of them. The knowledge-creating process is also the process of creating ba (11). The SECI model and the associated “Ba” of Nonaka and his colleagues is the most frequently used model of knowledge creation. The SECI model has four modes of knowledge creation that transforms the knowledge state of individuals and organizations from tacit to explicit and vice versa (11):

The fundamental to SECI model is the codification of knowledge into two basic forms: explicit knowledge (i.e. easily codified and shared asynchronously) and tacit knowledge (e.g. experiential, intuitive and communicated most effectively in face-to-face encounters).

Rachel Bodle model for mobilizing tacit knowledge.

Rachel Bodle combined the Nancy Dixon Dynamic Knowledge Creation Model (12) and SECI (11) and came up with the composite diagram for mobilizing the tacit knowledge in the area of organisational learning (13).

Jackson and Klobas model of knowledge transfer and creation.

The Jackson and Klobas model describes how personal knowledge is created – personal knowledge being what an individual knows (14). Personal knowledge is built up using mental models of the world – these models are frameworks that individuals use to make sense of the world.
KNOWLEDGE CREATION IN INDIGENOUS COMMUNITIES.

Community engagement with information and know-how.

Although the environmental and social conditions in which indigenous communities interact with the external environment are characterized by a constantly increasing degree of complexity but the flexible structure and relationship model of these communities propose sustainable solutions of many problems of the modern world. The interactions bring threats, in shape of globalization and colonization, as well as opportunities of engagement, engagement with new information and know-how. When community engages with information they do some activities (15):

- Discussing information with other people, including people who have different values and interests, in order to make sense of it;
- Using their knowledge to help them manage public resources, run organizations, and work on public problems together. In turn, their experiences as they work together generate information, knowledge, and understanding;
- Recruiting other people, including young people, to be interested and concerned about important public issues and giving them the skills they need for interpretation, analysis, collaboration when people ‘engage’.

In case of indigenous communities they do have pervasive institutional structures. These institutions are based on their social structure and networks where they receive information and know-how from external source. After receiving information they properly process, digest, and interpreted the information in local context. We observed that in indigenous communities knowledge creation occurs via two main processes: “interaction” and “action”. While “interaction” is related to exchange and communication, “action” is associated with the execution and implementation of knowledge.

Implicit vs Tacit and Explicit.

The division of knowledge in two fundamentals forms tacit and explicit is a common practice in organizations. Explicit knowledge is knowledge that has been written down or recorded as text, audio, video or graphics. It exists as a physical or virtual entity so it can be named, disseminated and measured even sometimes, its monetary value can also be determined. ‘Tacit’ refers to things we know that can’t be made explicit. Tacit knowledge influences feelings, thinking, and moving but is not accessible to consciousness. Where there are researchers i.e. Carl Frappao who introduced another form of knowledge that is implicit knowledge (16). From implicit knowledge we mean the knowledge believed to be tacit but can be transformed into explicit knowledge. This is not to say that all tacit knowledge can be transfigured into implicit knowledge. There will always be bodies of information, know-how and experience that remain tacit and can’t be transformed to explicit knowledge. For this research the same classification has been adopted. One motivation for this adoption is the unique structure of indigenous knowledge and community structure. Indigenous knowledge is mainly implicit, whereby it is stored and shared orally and disseminated mainly by practical use.
Tacit-Implicit-Explicit (TIE) Knowledge Creation Model.

The hallmark of our research is that we present a comprehensive beginning-to-end model of innovation and knowledge creation in indigenous communities. Specifically, our model examines five important dimensions of the knowledge creation and application process: (1) the acquisition of information and knowledge from networks of interaction; (2) Process the information within the community networks which includes people having different values, experiences and interest; (3) create values and innovations (new knowledge) from information while exercising it inside the field and daily life; (4) share the new experiences and results with other people, including young generation interested and concerned and giving them the skills they need for taking benefits from produced knowledge; (5) the impact of new knowledge on community collective system.

The model connects the information and knowledge flow in a sequential process. There are some limitations to be mentioned at this point: (a) being a model, it is a simplification and does not attempt to explain all aspects of knowledge and knowledge creation; and (b) there is no detail discussion of the interplay between guidelines within the processes and how they may work in combination.

**Table 1. TIE Model Constructs and Constructs’ Definitions**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Construct Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal networks</td>
<td>Formal collaboration (e.g., with government, elected bodies, local community org etc) between communities or groups.</td>
</tr>
<tr>
<td>Informal Networks</td>
<td>Informal interpersonal “social networking” between individuals.</td>
</tr>
<tr>
<td>Know-How</td>
<td>Practical knowledge of how to get something done.</td>
</tr>
<tr>
<td>Cognitive subsystem</td>
<td>Created by and inherent in the community members experiences, roles, and organizations i.e. elders council.</td>
</tr>
<tr>
<td>Activity subsystem</td>
<td>Created by and inherent in actions of the individuals and groups i.e. skills to grow the agricultural products</td>
</tr>
<tr>
<td>Social subsystem</td>
<td>Created by and inherent in relationships and the systems that supports those relationships i.e. family.</td>
</tr>
<tr>
<td>Tacit knowledge base</td>
<td>Knowledge that is rooted in mental models i.e. individuals' and groups' belief on cause – effect relationships.</td>
</tr>
<tr>
<td>Implicit Knowledge base</td>
<td>Knowledge that is rooted in actions that creates the experiences.</td>
</tr>
<tr>
<td>Explicit Knowledge base</td>
<td>Articulated, generalized and codified knowledge.</td>
</tr>
<tr>
<td>Combination</td>
<td>Linking new information with existing knowledge and experiment it in local context</td>
</tr>
<tr>
<td>Externalization</td>
<td>Sharing results of the test to facilitate the learning process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Integration</th>
<th>Making the results a part of the community collective memory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalization</td>
<td>Embedding the new, valid and reliable information in community social subsystem</td>
</tr>
<tr>
<td>Sophistication</td>
<td>Refining the information in local context</td>
</tr>
<tr>
<td>Comprehensiveness</td>
<td>The extent of exhaustiveness in investigating and testing alternative solutions to a problem</td>
</tr>
<tr>
<td>Creativity</td>
<td>The extent of adopting creative and innovative solutions to a problem</td>
</tr>
<tr>
<td>Consensus</td>
<td>The extent of shared consensus and commitment in implementing the chosen solution to a problem</td>
</tr>
<tr>
<td>Cohesiveness</td>
<td>The extent of community binding forces</td>
</tr>
</tbody>
</table>

**Figure 4. Tacit-Implicit-Explicit (TIE) Knowledge Creation Model**

In the most simplistic terms, the model looks the community cohesiveness, comprehensiveness, creativity and consensus as output that is associated with the cognitive subsystem, social subsystem and activity subsystem, which themselves are aided by information and know-how that is absorbed by the community and its members through its internal and external networks.

This model takes into account five major factors in the knowledge creating process:

1. The role of the community network of interactions as a source of important information and know-how. Such networks can possess formal and informal characteristics and the relevance of each turns out to be critical.
2. The integration of information and knowledge that is acquired with that currently existing in the community. Community has cognitive subsystem that inherent in the community members experiences, roles, and organizations i.e. elders council. These institutions work as information processing unit for community where the community assess the reliability and relevance of the information. The cognitive subsystem has the support of tacit knowledge base of the community which include the social customs, and in case of elders with vast life experiences. Building upon Leonard-Barton’s (17) findings that knowledge creation is dependent on four learning activities, one of them being shared and creative problem solving processes, we focused on the capitalization of knowledge within the activities of the community.

3. After processing in cognitive subsystem the community decides on the nature and status of information, whether it is relevant and reliable or not. If the information is valuable in its current state then the internalization process is applied and it embeds in social subsystem. On the other side if the information needs more work and test to make it then the combination processed would applied. In combination process community members link new information with existing knowledge and experiment it in local context. For this purpose the community has Activity Subsystem which is inherent in actions of the individuals and groups. This subsystem has the support of community implicit knowledge base which is mainly comprised of community members’ actions, and practical experiences of filed work. A critical weakness in knowledge research has been the measurement of created knowledge. Utilizing Dretske’s (18) idea that knowledge is justified belief that leads to action we measure knowledge creation as the output of the community decision making processes.

4. The Activity Subsystem would validate the status of information and know-how in terms of its relevance in local context. The output is the externalization process where the results of the test would be shared inside family institutions as well as with the people who are concerned. The Social subsystem provides relationships and the systems that support those relationships i.e. family. The failure and success of the process also become a part of explicit knowledge base which is normally comprised of songs, stories, proverbs and folklores etc., and can be considered as community collective memory.

5. If the information is relevant and reliable enough and internalization process is applied then the only additional process is sophistication process where the information and know-how would be refined in local context.

6. The output of the knowledge creation process. All too often work in this field fails to get to the bottom line. We argue that the in organization the knowledge creation process is the antecedent to the financial performance while in community the comprehensiveness, cohesiveness, creativity and consensus are the precursors.

**Case Study.**

The validity of the model was examined through an exploratory case study and analysis. We carried out study with Kelabits of Bario and Dusuns of Buayan in the remote rural communities, located on the island of Borneo, East Malaysia. Institute of Social Informatics and Technological Innovation (ISITI-CoERI) has a multi-award winning eBario bridging the digital divide project in Bario community since 2000. It has brought telephones, computers and the Internet to Bario, in the form of a community telecentre and computer laboratories at the two schools (19). There are 12 longhouses in Bario which are homes to about 1,000 people. The majority of the people are Kelabits, one of the smallest ethnic groups in Sarawak. They are generally farmers, growing the famous fragrant Bario rice. Prior to the project, there was also no telecommunication service and communication was conducted using radio calls, as well as by passing messages to departing passengers and getting messages from passengers arriving at the airport. Given its remoteness, the catch-phrase of the project was that if you could successfully implement such a project in Bario, you can do so anywhere. eBario project has been described as one of Malaysia’s most significant Internet development projects (20). The purpose of the project has been to demonstrate how ICTs can contribute towards locally-directed development in a remote and isolated community. Apart from greatly enhanced social communication, the project has resulted in increased computer literacy among the students, teachers and the community, faster response to emergencies, improved public health and job creation and increased revenues from tourism (21). In 2007, on the base of eBario project success story, the Govt of Malaysia provided support to replicate the same concept in four other indigenous communities of Malaysia. eBuayan telecentre is one the replication site of eBario project which is located in Buayan. Buayan is in the district of Penampang, Sabah, on the outskirts of the Crocker Range Park of East Malaysia. Buayan is a decentralized village divided into several zones: Marantai, Monnimbar, and Kionop Baru. There is no road access to the village. The village is only connected through the ancient “salt trails” that were once the only transportation route across the Crocker Range between Sabah’s interior and west coast. All the necessary supplies for the village and surrounding areas, including fossil fuels for generators, is carried in by porters through steep, forested terrain for a difficult six hour, ten kilometer hike that has been in both communities. The Telecentre is placed in a wooden house built by the community; while equipped with computers, printer, scanner, prepaid phones, and VSAT. The community has a management committee to run the affairs of telecentre and headed by a local champion, Irene Kodoyou.

To support the local economy Bario community organizes cultural activities from time to time. One of the famous activities is eBario Knowledge Fair (eBKF). ISITI-CoERI, UNIMAS along with partner organizations and Bario local community organize (eBKF) since 2007. The eBKF was instigated as pioneering example of Development Conferencing (22). Once in every two years the academicians, development professionals, policy makers and activists come together in remote village of Bario, Sarawak. The conference provides an opportunity to the participants to share their experiences and knowledge against the background of the achievements of the e-Bario telecentre and community radio initiative in terms of the development that has occurred there as a result of improved communications (23). On the occasion of second eBario Knowledge Fair 2009 a workshop has been organized for eBario replication project management committees to visit Bario and to learn from Bario community experiences of mobilizing local resources for sustainable economic development i.e. eco-tourism, using Information and Communication Technologies (ICT) for economic development, and sustainable agriculture practices. Among others, three members of eBayan management committee also participated as decided by the Buayan community. The Baro community organised visits to paddy fields and home stay programs where the expert from local community shared their experiences and information on the site.
After the eBKF, the members from the community returned to their villages and we observed that with the new information and know-how brought many changes in their community collective experiences and knowledge. The Buayan community members introduced Bario paddy farming in their village first time. They developed some very effective local practices of pest’s control which were not discovered by the Bario community before. The Buayan Bario case study can be explained by indicating the following factors;

1): The eBKF, eBario and eBuayan provided formal network to Buayan and Bario community.

2): The eBuayan management committee members bring along other, the Bario paddy field visit’s information to Buayan community. The community takes it as opportunity to try the Bario paddy farming in Buayan.

3): As the new information and know-how was considered relevant, so the cognitive subsystem and activity subsystem supported the combination process through which the farmers linked their field experience of farming with the new information and cultivated Bario paddy on test basis. The test was quite successful and new practices (knowledge) of Bario paddy farming, and pest’s control is explored.

4): On the basis of successful test and experiment the externalization process has been performed where the farmers shared their experience within family institutions as well as with other interested community members and now many farmers are practicing the same.

5): The new practices are integrated in community cognitive system as the same farmers are the members of the community so when next time new information and know-how will reach by the same process it would be judged on the base of newly created knowledge and skill too.

We are still in process of getting more case studies so we can better formulize our model. One another study (23) has been done where we examined the same case study and knowledge creation form knowledge governance perspective.

Table 2.IKGF and Knowledge Creation. Framing Buayan – Bario paddy cultivation (23).

CONCLUSION.
Finally, what is new about this approach, and how might it help the researchers who are working with indigenous communities and indigenous knowledge? The knowledge creation in indigenous communities to be studied in this research is expected to have some implications to the modern knowledge creation process. Identifying these implications will enable the knowledge management field to benefit from the conceptual model of knowledge creation systems in indigenous communities that have been serving the information and knowledge needs of their users for thousands of years. We tried to identify critical social processes in the effective creation of knowledge, and present them in the familiar form of an tacit-Implicit and Explicit classification model. This knowledge creation model may bear new light on the methods of knowledge creation within the modern day firm.

BIBLIOGRAPHY


