Introducing Indigenous Knowledge Governance into ICT-based Indigenous Knowledge Management System

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Abstract

Information and Communication Technologies (ICTs) for Indigenous Knowledge Management (IKM) have been designed using the conventional approach of creating and manipulating databases of knowledge. This typical approach of IKM generates the issues of indigenous knowledge governance, de-contextualisation and data manipulation. Hence, the main research question of this study is "How can we introduce indigenous knowledge governance into ICT-based Indigenous Knowledge Management System (IKMS)?"

The study has been conducted in three phases with two indigenous communities of Sarawak, East Malaysia, using the eBario and eLamai Telecentre as a local collaborating institutions.

The main outcome of the study is the methodology of conducting a multidisciplinary research and designing Indigenous Knowledge Governance Framework (IKGF). The framework works as an analytical tool that can help in understanding the essential context in which indigenous knowledge management processes occur.

The study argues that in order to design appropriate ICT tools for indigenous knowledge management, information technology professionals need to understand, model and formalise the holistic indigenous knowledge management system and then use this understanding as a basis for technology design and approaches.

Introduction

A wide range of digital tools have been developed and cultural heritage institutions are exploring the use of ICTs for preservation and improving access to Indigenous Knowledge (IK). However, ICTs for IKM have been designed using the conventional approach of creating and manipulating databases of knowledge (Velden, 2010). Early efforts in IKM

focused on developing digital technologies to store, capture, and distribute knowledge (Agrawal, 2002). The focus at present has shifted, however, to make explicit the tacit and implicit knowledge. The current approaches tend to overlook the community's creative expressions, practices of innovation and instead consider IK to be a static resource frozen in time and place. These typical approaches of IK databases design thus fail to a large extent in serving the needs of indigenous communities, as it tend to alienate IK from the essential context such as social, cultural and governance framework (Velden, 2010; Winschiers-Theophilus, Jensen, & Rodil, 2012).

The prime objective of this research is to develop a holistic framework for IKM that projects the ontological structure of the wider social cultural and governance system in which IKM processes occur. The investigation was done in three phases; firstly, we explored the theoretical gaps and the inherent structure of IKMS in communities. Secondly, we addressed the gaps by modelling IKMS in communities and designing a structured indigenous knowledge governance framework. Thirdly, we used the framework to model an existing IKMS and for designing, developing and implementation of ICT-based IKMS. The designed framework helps researchers and ICT professionals to understand the unique structure of IKM and accommodate it in the design and development of ICT-based IKMS.

The remainder of this paper is structured as follows. The first part of the paper presents background of the research and introduction of the sites and communities where research has been conducted. . Second part illustrates the research framework and each phase of the study in detail. The last part, concluding section, presents reflection of the study.

Background

Current technological trends and developments have hardly been informed by indigenous and rural knowledge systems (Kapuire & Blake, 2011), which is different from non-indigenous knowledge systems in many ways. The unique features of IKMS are based on two basic system perspectives: "holistic" and "living".

Holistic System

We define "holistic" as a "whole" system where all aspects of life – both tangible (such as oral traditions and activities) and intangible (such as governance systems and spiritual values) – are assimilated and interconnected and cannot be separated from one another. According to Velden (2002), IK is a highly contextualised body of knowledge that is linked to location,

situation and cultural, social and historical context. The IKMS is a complex structure that cannot be understood by only examining the parts (processes, technology, people, economic, social and ideological aspects). It must also take into account how the parts interact to make a whole system.

Living System

In Western epistemologies, IK is generally interpreted as a static and archaic form of knowledge while the indigenous researchers interpret IK as;

- a way of life (McGregor, 2004)
- a way of knowing (Aikenhead & Ogawa, 2007) and
- adaptable and creative system (Macchi & Oviedo, 2008).

The indigenous perspective is not just "knowledge" *per se* (a thing, an object) but also a way of life that includes dynamic practices such as oral traditions, listening to stories, singing songs, reciting prayers, dancing at celebrations, and participating in ceremonies; all of which are passed on from generation to generation.

In the conventional approaches of IKM, knowledge is de-contextualised by extracting it from the living and holistic system of IK and storing it as data in databases. IKM is a long process and complex system of activities that deals with the multidimensional challenges such as digital technologies, intellectual property rights and the complex social, cultural and belief system of the communities. The current ICT-based IKMS and the frameworks provide a product-view of IKM and mainly satisfy the Western conception of knowledge management, in which knowledge is stored as abstract entities in digital forms. Hence, a well-formulated holistic framework is needed to provide real-time modelling of the living IKMS assimilated with the structure and use of ICT tools.

The Research Sites

The study was conducted in two remote sites of Sarawak in East Malaysia: Long Lamai, a Penan settlement, and Bario, a Kelabit settlement. Sarawak is situated on the northwest of the island of Borneo. Indigenous peoples – collectively known a *Dayaks* - comprise two-thirds of Sarawak's population (Ngidang, 2005). Many, distinct ethnic groups exist in Sarawak, including the Penan and Kelabits. These two sites were chosen largely because Universiti

Malaysia Sarawak (UNIMAS) maintains a research collaboration and development partnership with Bario and Long Lamai communities.

Research Framework

The research operationalisation process (Fig. 1) is divided into three phases. In Phase 1, we conducted a literature review and collected the empirical data to discover existing theoretical gaps among studies of IKMS. In Phase 2, we addressed the gaps by designing and modelling the indigenous knowledge management processes and the indigenous knowledge governance system. In Phase 3, we used the framework to model an existing community IKMS and then formalised the framework by using it as a base for the design, development and implementation of ICT-based IKMS.

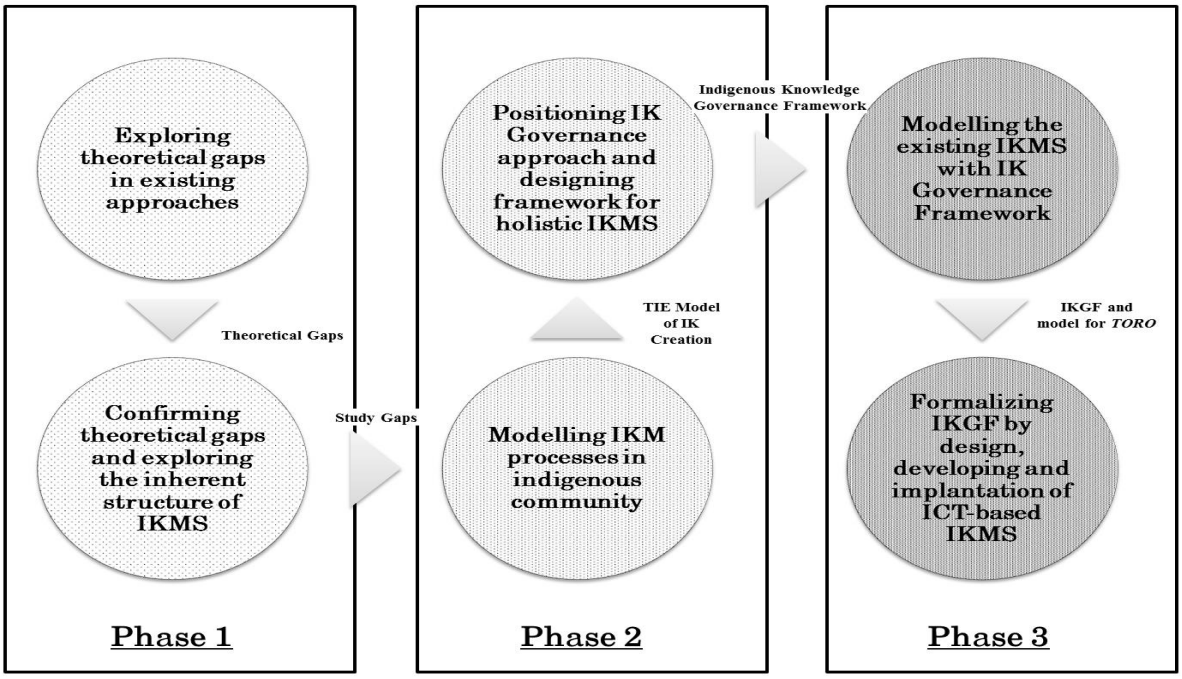

Figure 1: Research operationalisation

Phase 1: Exploring Theoretical Gaps

In this phase, a through literature review has been conducted to explore the theoretical gaps in existing literature. The review found a gap at epistemological level in defining IKM. The current definitions tends to de-emphasise the comprehensive process oriented IKM and mainly focuses on the processes of "capturing" and "distribution" while undermining the IK creation process (Yeo, Zaman, & Kulathuramaiyer, 2013). The approaches also reflected in

the digital technology designs. As noted by Agrawal (2002) the main aim of the IKM databases is to "collect" and "distribute" available information.

Based on the Burtis (2009); Ngulube (2002) and Velden (2010), we identified the influencing factors that's should be considered and addressed by the researchers and IT professionals while developing a digital solution for IKM. The focus of software system for IKM should be extended to incorporate complex issues of IK ownership, IPR legislation, cultural protocols and technical issues in the form of choice of media and access at the project planning level.

The second part of the first phase explores the study gaps by observing a case study from the field and to develop a methodological approach to reveal the inherent structure of IKMS in indigenous community of Bario (Yeo, et al., 2013). The study confirms that the knowledge creation process is arguably the most important step in the IKM processes. It is highly rated by the respondents from the Bario community. The study also reveals that the organisation's KM tools and frameworks cannot be used in the existing shape for IKM because of the differences between indigenous and non-indigenous knowledge domains. The study also highlights the features that are not taken into account in the conventional approaches of designing ICT tools and frameworks for IKM. These features include the indigenous governance system, organisational structure, the protection of IK and resource management, and collective community activities.

Phase 2: Positioning Indigenous Knowledge Governance

As explored in Phase 1 of the study, the recent wave of research undermines the knowledge creation process in indigenous communities which is an important and well established area of research and development in organisations. The ultimate effect is that IT researchers focus on the "dissemination" and "storage" processes while neglecting the "living" characteristic of IK. In this phase first, we delineate in more detail the knowledge creation process in indigenous communities and present it as a "living system". A living system is one that constantly creates new knowledge, closely connected to day-to-day activities and social systems and is reflected upon before acceptance and assimilation. Furthermore, we outlined the community's engagement process with new information and know-how and present Tacit, Implicit and Explicit (TIE) model of knowledge creation in indigenous communities (Zaman, Yeo, & Kulathuramaiyer, 2011a).

In second part of the Phase 2, we expanded the scope of indigenous knowledge management with notion of indigenous knowledge governance. In the indigenous way of life, communities

govern their knowledge by coordinating activities that are influenced and controlled by social and cultural systems. Efforts in managing IK using ICT technologies face a number of shortcomings. For example, the lack of consideration of the holistic structure of IK, being overly reliant on persistent data and the loss of control over knowledge assets when they become stored and structured in databases. In this context, IK represents a critical resource that needs to be focused towards specific processes and governance activities. To address this gap, we presented indigenous knowledge governance framework as a holistic model of indigenous knowledge management (Zaman, Yeo, & Kulathuramaiyer, 2011b).

The standard IKGF is the abstract model of IKM system contains the set of cooperating components that are grouped into seven layers Capital Layer; IK Governance Layer; Activity Layer; KM Layer; Data Repository Layer; Community Engagement Layer; and Cross-Cutting External Environment Layer.

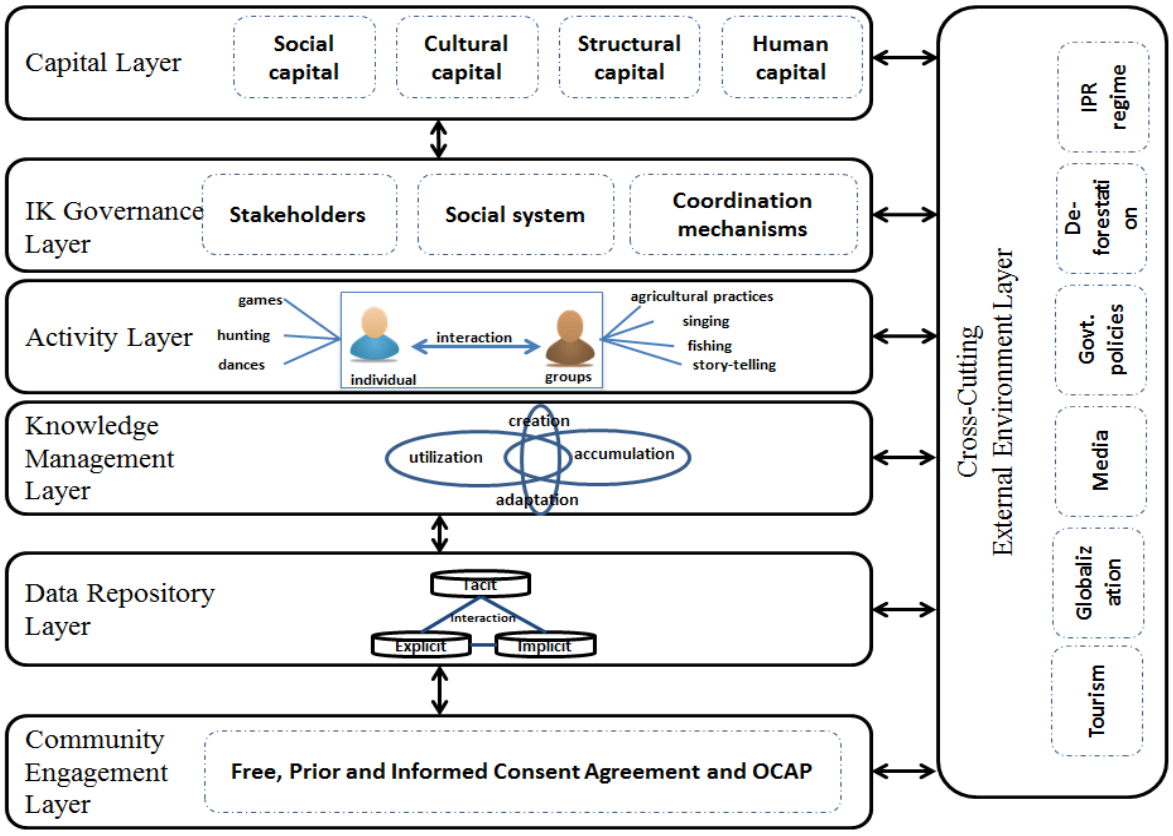

Figure 2: The logical architecture view of a layered IKG system (Zaman, et al., 2011b)

Phase 3: Validating and Formalising IKGF

In this phase of the research, first we presented an explanatory case study of using IKGF as an analytical tool for understanding Penan Toro activity from IKM perspective. Depicting the

complex structure of Penan IK in IKGF layers model helps in understanding the holistic context of Toro IKMS.

In second part of this phase, we formalise the framework by using it for designing, developing and implementing the eToro platform (Siew, Yeo, & Zaman, 2013). The eToro platform is a combination of ICTs and community activities to support the Indigenous Botanical Knowledge (IBK) of the Penan community of Long Lamai in Sarawak. The proposed framework has helped in developing a common understanding of the eToro team members for planning, designing, developing and implementing ICT-based IKMS. From the researchers' perspective, a series of formalised methodology were identified. These are: (1) Designing Process Flow Diagrams in order to understand processes, roles, actions & rights of stakeholders; (2) Developing Cultural Protocols for community, researchers and data engagement; (3) Designing Data Instruments for eliciting community needs and acquisition of eToro; (4) Developing Prototypes for digital data collection and indigenous content management and (5) Capacity Building Program for participatory digital data collection and processing (Zaman, Yeo, & Kulathuramaiyer, 2013).

Conclusion

Based on the results of this research, IKM is a complex system that cannot be understood by examining individual parts (processes, data, activities, people, economic etc.) only. It is also about how these parts interact and combine to make a whole system. Whereas a wide range of digital IKM tools have been developed, special attention has been given to use ICT for the management of this highly valuable resource. IK takes predominantly tacit and implicit forms, locked in the community's activities and governed by local social and cultural frameworks. The use of ICT for IKM, will create the problem of knowledge de-contextualisation by extracting IK from the living and holistic system and storing it as raw data. Furthermore, ICTs alone cannot provide all the answers or solutions to IKM, but it can be a part of the solution. In order to design an adequate ICT-based IKMS, a holistic approach needs to be adopted that accommodates the community communication pattern, social and cultural systems and governance mechanism.

References

Agrawal, A. (2002). Indigenous knowledge and the politics of classification. *International Social Science Journal, 54*(173), 287-297.

Aikenhead, G., & Ogawa, M. (2007). Indigenous knowledge and science revisited. *Cultural Studies of Science Education, 2*(3), 539-620.

Kapuire, G. K., & Blake, E. (2011). *An attempt to merge local and technological paradigms in the digital representation of indigenous knowledge.* Paper presented at the Proceedings of the Indigenous Knowledge Technology Conference 2011, Namibia.

Macchi, M., & Oviedo, G. (2008). *Indigenous and traditional peoples and climate change: Issues Paper*: International Union for Conservation of Nature.

McGregor, D. (2004). Coming full circle: Indigenous knowledge, environment, and our future. *American Indian Quarterly, 28*(3/4), 385-410.

Ngidang, D. (2005). Deconstruction and reconstruction of Native Customary Land tenure in Sarawak. *東南アジア研究, 43*(1), 47-75.

Siew, S.-T., Yeo, A. W., & Zaman, T. (2013). Participatory Action Research in Software Development: Indigenous Knowledge Management Systems Case Study *Human-Computer Interaction. Human-Centred Design Approaches, Methods, Tools, and Environments* (pp. 470-479). Berlin Heidelberg: Springer.

Velden, M. V. D. (2010). *Design for the contact zone.* Paper presented at the Proceedings of the Seventh International Conference on Cultural Attitudes Towards Communications and Technology, F. Sudweeks, H. Hrachovec, and C. Ess.

Winschiers-Theophilus, H., Jensen, K., & Rodil, K. (2012). *Locally situated digital representation of indigenous knowledge.* Paper presented at the Cultural Attitudes Towards Technology and Communication, Australia.

Yeo, A. W., Zaman, T., & Kulathuramaiyer, N. (2013). Indigenous Knowledge Management in the Kelabit community in Eastern Malaysia: insights and reflections for contemporary KM design. . *International Journal of Sociotechnology and Knowledge Development (IJSKD).*

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2011a). *Harnessing community's creative expression and indigenous wisdom to create value.* Paper presented at the Indigenous Knowledge Technology Conference 2011 (IKTC2011): Embracing Indigenous Knowledge Systems in a New Technology Design Paradigm, Windhoek, Namibia.

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2011b). *Indigenous Knowledge Governance Framework (IKGF): A holistic model for indigenous knowledge management.* Paper presented at the Second International Conference on User Science and Engineering (i-USEr2011) Doctoral Consortium, . Kualalumpur.

Zaman, T., Yeo, A. W., & Kulathuramaiyer, N. (2013). Augmenting Indigenous Knowledge Management with Information and Communication Technology. *International Journal of Services Technology and Management, 19*(1/2/3), 12.