

INTERNATIONAL SYMPOSIUM ON ICT FOR RURAL DEVELOPMENT 2006

Faculty of Computer Science
& Information Technology,
UNIMAS, Kota Samarahan,
Sarawak, Malaysia

19-20 April 2006



PROCEEDINGS



organizer

Universiti Malaysia Sarawak (UNIMAS)
Asian Info-Communication Council (AIC)

in collaboration with

ICT Unit, Chief Minister's Department, Sarawak
Malaysian Communication and Multimedia Commission (MCMC)
National Institute of Information and Communications Technology (NICT), Japan

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ON ICT
FOR RURAL DEVELOPMENT

PROCEEDINGS OF ICT4RD

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Organised by
Faculty Of Computer Science and Information Technology, Universiti Malaysia Sarawak
Asian Info-Communications Council

In collaboration with
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Editorial Preface

A warm Selamat Datang (welcome) to our local and international speakers and participants to the inaugural International Symposium on ICTs for Rural Development (ICT4RD) 2006.

As general acknowledged, developing rural communities through ICTs requires the networking of expertise in a variety of fields, and working together towards a common goal. We believe this symposium can provide the platform for the sharing of knowledge and experiences in the effective use of ICTs in bridging the digital divide. In addition, this symposium will also highlight the potential usage of innovative and affordable ICTs in bringing about sustainable progress & advancement in the development of rural communities.

We believe these will be achieved with the participation of speakers from universities (UNIMAS, Graz University of Technology, Austria), government agencies (ICT Unit, Sarawak Chief Minister's Office; Malaysian Communication and Multimedia Commission; Malaysian Ministry of Rural and Regional Development), NGOs (AIC), research institutions (National Institute of ICT, Japan; The Information Society Institute, South Africa; Localisation Research Centre, Ireland) and industries (Telekom R&D). Given that the speakers are experts in their respective domains, participants will be enlightened by not only the current developments and programmes of application of ICTs for rural development within and outside Malaysia, but also innovate and state-of-the-art technologies that can aid in improving the lives and livelihood of rural communities.

In addition, with the participants from multi-disciplines, and the papers to be presented, ICT4RD 2006 should provide an excellent avenue for discussion and exchange of ideas, potential collaboration to plan, and further encourage programmes and research activities which would be appropriate and beneficial to the remote and rural communities.

Lastly, on behalf of UNIMAS and Asian Info-Communications Council (AIC), we hope you have a pleasant stay and productive deliberations at the International Symposium on ICTs for Rural Development (ICT4RD) 2006.

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IMPLEMENTING INFORMATION AND COMMUNICATION TECHNOLOGIES FOR RURAL DEVELOPMENT: LESSONS LEARNT FROM THE eBario PROJECT

by

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Abstract - This paper describes our experience in introducing information and communication technologies (ICTs) to a remote and isolated rural community of Bario in Sarawak. The project is called eBario. One of the major aims of the project is to narrow the digital divide between urban and rural people in Sarawak. Specifically, the project aims to achieve sustainable human development for the community through the deployment of ICTs. Bario is the traditional homeland of the Kelabit. It is located in central northern Sarawak near the border with Kalimantan, Indonesia. It is highly inaccessible, and the only practical way to get there is by air. Due to its relative isolation, the community is deprived of a wide range of information categories. Their current sources of information are dominated by face-to-face communication. Bario exemplifies very much the disconnected portion of the digital divide. The context, the challenges faced, successes achieved, and critical success factors based on our experience in implementing the eBario Project to bridge the digital divide are discussed.

Keywords: eBario Project, Bridging the Digital Divider, ICTs in Rural Communities, Critical Success Factors

1 Introduction

The use of information and communication technologies (ICTs) is expanding rapidly in developing countries including Malaysia. In fact, the Malaysian Government emphasizes that ICTs has to become a central element in the country's aspiration to become a fully developed nation by the year 2020 (Mahathir, 1991). Thus, the importance of ICTs to national development has received much attention, which partly has led to the development of the Multimedia Super Corridor (MSC), one of the government's most ambitious and prestigious efforts to push for the use of ICTs in national development programmes. The scope and ambition of the MSC's seven flagship applications demonstrate the breath and impact that ICTs is expected to have on every strata of the Malaysian society (Multimedia Development Corporation). Despite the government aggressive initiative in adopting ICTs, the present scenario indicates that the expansion and use of ICTs is seen largely as an urban phenomenon. It is unfortunate that people in the rural areas are unable to take advantage of this technology.

The current plans for the deployment of ICTs applications throughout Malaysia have limited mechanisms to ensure that remote rural populations are able to enjoy the same benefits as their urban counterparts. Lee (1999), for example, notes that the Malaysian government has been stressing more on social equity in its public policy, but neglected the issue of information access and information equity, until very recently, with the formation of the National Information Technology Council (NITC). For Sarawak, the issue of information access and information equity is becoming a major concern, particularly, because two thirds of its population resides in the rural areas and do not have access to ICTs facilities. Harris (1999) observes that although Sarawak was promised a full and equitable share in the benefits of national development, its rural population has great potential to be sidelined in the nation's quest towards a knowledge-based society, which will be based on ICTs. This situation, if left unchecked, would produce a new kind of poverty related to an imbalance in access to ICTs facilities and services.

However, recent development in ICTs can prevent this plight by making it possible for remote communities to enjoy the benefits of connectivity that their urban counterparts now take for granted (Harris, Songan, Bala & Khoo, 2001). Radical efforts have been taken by certain agencies to promote the use of ICTs by rural people. In India, for example, the M.S. Swaminathan Research Foundation has established six Village Information Shops, which enabled rural families to access and exchange a basket of information using ICTs (Balaji & Harris, 2000). Meanwhile, in Costa Rica, Massachusetts Institute of Technology (MIT) has implemented "digital town centers" in remote villages (Harris, 1999). These initiatives have inspired a group

of researchers from Universiti Malaysia Sarawak (UNIMAS) to conduct a similar research project to introduce ICTs to a remote community in Bario, Sarawak.

2 The eBario Project

The eBario project was undertaken against the background of the Malaysian Government's aggressive adoption of ICTs for national development and the underdeveloped infrastructure and scattered population of Malaysia's largest state, Sarawak. It has as its rationale the delivery of equal access to ICTs for those remote and marginalised communities that characterise rural life in Sarawak. Many such communities are un-served by road and have access to meagre or non-existent telecommunications services.

The major objective of the project was to define opportunities for social development, which are available from the deployment of ICTs within remote rural communities in Sarawak, using the Smart School as a demonstrator application and a community telecentre set up. A telecentre takes the form of public-access facility to provide a combination of ICTs services, ranging from e-mail to full Internet and World Wide Web (WWW) connectivity. Additionally, services such as fax and word processing may be provided or even specialised applications for tele-medicine or distance education (Gomez, Hunt & Lamoureux, 1999). The community is provided with Internet access via the telecentre and the computer laboratory at the school. Using participatory action-oriented research methodology (which will be discussed more under methodology), the project identify further needs and opportunities within such communities that can be satisfied by the innovative use of contemporary ICTs, and demonstrate how significant and sustainable development can be achieved by remote communities through such implementations.

The project is intended to introduce computers systematically so that they could be used to improve the living conditions of the entire community. Initially, a computer laboratory was established at the Bario secondary school prior to the implementation of the community telecentre. The scope was eventually extended to include the primary school and health clinic.

3 Methodology

We were made aware that from past experiences with technologies, their applications have generated not only solely disappointment, but also negative consequences. In a sense, technologies themselves do not guarantee benefits for the local people. We need to ensure that not only the success of the technology itself (meaning the technology runs and functions well) is achieved, but also that the people benefit through the applications. We were very much anxious with the question of, "How do we ensure that these technologies bring benefits to the people?"

We have learned from observing and exchanging ideas with other practitioners in ICTs for rural development to shift from looking at technology to looking at people's needs. There is a need to put equal importance on understanding the technology and the context in which the technology will be deployed. In fact, to some people, it is far more important to look beyond the technologies to the social, economic and political systems of the community (Garcia & Gorenflo, 1998). The idea is to put emphasis on the context in which the technology will be introduced, and who will use the technology rather than on the technology itself. As Anderson, Crowder, Dion, and Truelove (1998) rightfully emphasized that in our enthusiasm for ICTs and their potential, we should not forget that the focus should be on people, organization and processes rather than on the technologies themselves. Basically, we should focus on people and on what people can do with technology.

Learning from others, like Anderson et al. (1998) and Garcia et al. (1998), we adopted the idea of doing a needs analysis of the people in Bario and their existing communication patterns as a preliminary step towards the effective and successful deployment of ICTs in rural areas (World Bank, 1998). This effort will help to identify requirements, for example, of training, opportunities (skills and knowledge) that exist within the community, which are essential in the process of selection and content development of the technology, which is an important step to ensure usefulness and appropriateness of technology for the local people.

Besides need and skill assessment, it is important to obtain a clear understanding of local communication patterns and processes to ensure appropriate applications of technologies and content to the local situation and for harmonization and integration with existing communication channels and processes. This includes cultural norms, where and how people communicate, what is communicated, and by whom. This is crucial since the success of the ICTs application largely depends on its integration within the local communication networks (Anderson et al., 1998).

Having this in mind, we adopted the following guiding principles in our approach to implement ICTs in Bario (Bala, Harris & Songan, 2003):

- useful information systems will be embedded in the needs of the community;
- specific actions are required by both the researchers and the community in order to articulate those needs;
- participatory action research describes a suitable set of principles for the conduct of the research; and
- methodologies for designing and implementing useful information systems will emerge from participatory action-oriented research activities.

Guided by these principles, Participatory Action Research (PAR) as recommended by Chambers (1997) was chosen as the research methodology, in that it was deemed necessary that:

- we should learn about life in Bario from the community;
- the community should learn about ICTs from us, the researchers;
- community members should perform major portions of the research;
- we should be able to identify with the community; and
- as a team, the community-researchers should be capable of critically reflecting upon iterative cycles of action in order to achieve mutually beneficial outcomes from the project.

Within the PAR framework, we engaged community members directly in the process, for instance, to conduct surveys, performed interviews and focus group meetings and conducted community gatherings to collectively made decisions, and to direct the conduct of the research. A system of close consultation between the project team and the rural people has been evolved, so that their needs are realistically assessed. A community audit through a socioeconomic survey was conducted on 140 (out of 242 households in Bario) household heads to get indicators on status of literacy and education and the state of telecommunication infrastructure. This includes identifying existing communication pattern and channels of information flow, profile of potential users of the technology, awareness and usage the technology, attitudes and perceptions of the users towards the technology. These revealed the gaps and the local availability of skills to bridge them.

4 The Community

Location. Bario is located in the central northern part of Sarawak near the border with Kalimantan, Indonesia. It exemplifies the disconnected portion of the digital divide. For instance, while most of the district's 1,200 inhabitants have heard of a computer, more than 90.0 percent have never used one, let alone logged onto the Internet (Songan, Harris, Bala & Khoo, 2000). Thus, Bario met all of the experiment's qualifications for the pilot project, and presented a challenging environment in which to test the idea of rural Internet connectivity in Malaysia.

Bario is the hub of life in the Kelabit Highlands, and the unofficial capital for the Kelabit people. It is the centre of most activities and of important government offices. These government offices include the immigration office, forestry department, the police station, agriculture department, medical department, the civil aviation centre and a primary and secondary schools. Other important centers are the Borneo Evangelical Church, the Malaysian military base, shops, lodging houses, the Malaysian Airlines ticketing office, and the airport. The location of these offices, shops and institutions makes Bario the center of activities for dealing with government, commerce, trading and exchange of ideas. Prior to World War II, the only means of communication to Bario was by foot, climbing mountains, following the mountains ridges, crossing and re-crossing rivers and valleys for several weeks. Today, the only practical means to get to Bario is by air. There is no road, and a land expedition requires a river journey plus an additional weeklong trek across forested mountains.

The People. The Kelabits are one of the most remote ethnic groups on the island of Borneo. Prior to the early contacts in the 1920s, the Kelabits were known as head-hunters. However, rapid change after the initial exposure to outside influences led to the introduction of formal education when the first school was established in 1946 in Bario. It drew pupils from the nearby longhouse communities surrounded by jungle. Prior to this, there was no school in the Highlands and no Kelabit was literate. Today, there are two schools in Bario, primary and lower secondary, with nearly 200 pupils. Despite the isolation and rudimentary facilities, the schools achieve enviable results, and many of their pupils have progressed to attain advanced university degrees. Today, many Kelabits occupy influential positions in Malaysian national life as senior government officials, academics, businessmen and professionals. Even though the Kelabits have gone through rapid social and economic change within a short span of 50 years, they have managed to maintain certain aspects of their culture which are still unique, particularly their music and dance. Many Kelabits still live in traditional longhouses, which contain a mix of communal living areas running the length of the house and individual apartments for each family.

A survey conducted in September 1999 (Songan, et al., 2000) indicates the socio-economic characteristics of the Kelabits in Bario, as describe below.

Religion. The majority of the Kelabits (97.9 percent) are Christians. A small percent (2.1 percent) are Muslims. The Kelabits were first exposed to the Christian religion in 1939, when the Australian missionaries came to Bario to spread their religion. In 1973, a spiritual revival took place in Bario and the Kelabits as a community embraced Christianity wholeheartedly.

Age. Most Kelabits in Bario ranged from 25 years old to 78 years old. A majority of them (72.9 percent) are between 31-60 years old. Approximately 83.0 percent of the present population is in the actively working age group, whose age ranged from 25 to 60 years old. This group is the main contributor towards the economic development of the family and the community.

Education. The educational level of the Kelabits living in Bario is considered quite low because only 0.7 percent of them have completed a university education. Approximately 19.0 percent of them have primary school education, 20.7 percent finish lower secondary school education and 30.7 percent complete upper secondary education. The illiteracy rate is quite high because approximately 29.0 percent of them have no education at all. The Kelabits who live in Bario are mostly the elderly and very young ones. The educated Kelabits have left their homeland to seek well paid jobs in the cities and also migrated overseas.

Occupation. The majority of the Kelabits in Bario (67.2 percent) are farmers. A number of them are government servants (18.6 percent), while 10.7 percent are small time businessmen, 2.1 percent work as pastors, and 1.4 percent as private sector employees. Most of them are rice cultivators, planting both dry and wet rice. However, it is the cultivation of wet rice that distinguishes the Kelabits from many other indigenous groups in Sarawak, most of whom grow dry hill rice. Bario rice is famous for its sweet aroma and pleasant taste.

Household Income. While a majority of the households in Bario (70.7 percent) get a monthly income below RM500, only 10.7 percent earned more than RM1,000. Approximately 19.0 percent of them get a monthly income between RM501-RM1,000. The mean monthly household income of the Kelabits in Bario is RM597.

Pattern of Communication. Existing forms of information exchange were examined as well as desired patterns of information delivery (Bala, Khoo, Songan & Harris, 2000). The sending of letters is a common feature of the local information system. Communal meetings also play an important role in disseminating information locally. Many people expressed frustration over the ineffectiveness of relaying important messages particularly to people outside Bario. This is particularly so for government servants who work in different government departments in Bario, for example, the Medical Department, Agriculture Department, Forestry Department, Immigration Department. The research revealed that almost nobody receives information about agricultural practices, whereas around 90 percent of respondents would like to receive a lot of information about them. Approximately 68 percent of respondents receive no information about information technology, but 98 percent would like to receive a lot. Delivering more information about information technology would appear then as potentially more popular than delivering more information

about agricultural practices. Information about information technology appears as the largest information gap. Current patterns of information actually received are dominated by religious information, with agricultural and family matters ranking next. Most information that is sent outside of the community concerns families, with religious information ranking closely behind. Relatives are the major source of information, outranking others in terms of the amount of information received by the community, with community leaders next. In this respect, face-to-face contacts outweigh all others as channels of incoming information, with the radio, church congregation and community meetings ranking about equally next. The researchers concluded that the Bario community has depicted a progressive readiness and enthusiasm for technology-induced improvements in their communications resources, namely the radio, radiotelephone and the airport. From one perspective, it can be argued that the Internet represents a logical extension of a trend towards technology that the Bario community has experienced in the development of its communications capability. Moreover, the expressed desires for additional incoming information, such as family communications and information about ICTs, are considered to be readily available from the ICTs that are being installed, suggesting that when Internet access becomes available, it will be quickly put to good use.

Change Pattern. Like many other communities in Sarawak, the Kelabits have experienced rapid change in recent years. But embracing change has not been without pain for the Kelabits. With education, for instance, came a gradual drift away from the Highlands. Many educated Kelabits left their homeland to seek well-paid positions in the distant Malaysian towns and cities of Miri, Kuching and Kuala Lumpur. Today, only about one thousand out of approximately 5,000 Kelabits remain in the Highlands, and they are either the elderly or the very young ones. They remain in the Highlands to tend their family farms, often with the help of neighbouring and related, immigrant labour from across the Indonesian border (Bala, 1999).

As the Kelabits migrate for further education and for better job opportunities, they also meet people from outside the community. One of the results is the increasing occurrence of inter-marriages between the Kelabits with non-Kelabits (locals as well as foreigners). Inter-marriages have become such a common phenomenon that it is not unusual for several members of a family to marry non-Kelabits, and many have permanently left the Highlands or even migrated overseas to the UK, USA, Canada, Holland, Australia and New Zealand. The phenomenon has caused some concern in the community in recent years.

As a result of the recent diaspora of the Kelabit people, there exists a need to bridge distances between Kelabits in the Highlands and those living outside the Highlands. One of the first attempts was to build an airstrip. The first grass airstrip was built by the Borneo Evangelical Mission (BEM) in 1953, and was mainly for mission purposes, but eventually was taken over by the Department of Civil Aviation in 1957 (Talla, 1974). This airstrip was eventually officiated by the Colonial Government in 1961, which improved communications and transportation tremendously (Bala, 1999). In 1996, a new tar-sealed airstrip was completed leading to a more convenient transportation mode in and out of the Highlands for the Kelabits.

This does not mean that the Kelabits in the Highlands have no other means to interact with the outside world. A radio service centre, popularly known as inan radio call (lit. radio call place) was set in 1993 to help the locals. The calls through Very High Frequency (VHF) radio services are subsidised by the government. To make a call, one has to queue to book a call with the operator who then will place a booking by calling the telephone operator several hundred kilometres away in Penang, who then connects the line. By the end of 1999, the Bario community of almost 1,000 people was averaging 750 calls per month from this facility.

5 Challenges Faced

Based on our experience in the eBario Project, the challenges that are faced in implementing ICTs for bridging the digital divide are largely related to the aspects that are described below (Songan, Khairuddin Ab Hamid, Yeo, Gnaniah, Hushairi Zen, 2006).

Costly Infrastructure, Connectivity and Use. Non-existence and under-developed telecommunications infrastructure remains an important impediment to the expansion and use of ICTs in the rural areas. It restricts access and keeps it expensive. While computer prices have declined, telecommunications continue to be costly and of limited availability. The financial cost of introducing ICTs in rural areas, which

have access to meagre or non-existent telecommunications service is costly. In Bario, for instance, there was no basic infrastructure for ICTs implementation. A few Very Small Aperture Terminal (VSAT) ground stations have to be set up to enable Internet connectivity. The research team had to work from scratch to explore ways and means to ensure 24 hours uninterruptible power supply. The team resorted to solar panels and diesel generator to ensure stable power supply at the telecentre. The installation of technologies and especially equipment to secure access to the Internet is usually beyond the community's financial means.

Poor Power Supply. As mentioned above, power was supplied using solar panels and diesel generator to the telecentre. However, the telecentre has to resort to only solar power due to the increase in the price of diesel. Given Bario's remoteness, diesel can only be flown from Miri using a Sky Van - a cargo-carrying aircraft; passenger aircrafts are prohibited to transport fuel. Unfortunately, the Sky Van is usually unavailable due to charters to other places. Thus, there have been occasions that diesel is hard to come by. The price of one gallon of diesel in 2000 was about RM12 (USD3.16) - in the city one gallon costs RM3.21 (US\$0.85). In 2005, the price of one gallon of diesel rose up to RM32 (USD8.42). Running a generator for about 4 hours (which uses up a gallon of fuel) would be cost prohibitive; there are other costs such as paying the technical staffs' wages at the telecentre. Thus, the power is mainly through solar panels. The solar panels were sufficient to run about 4 computers for about 3-4 hours on weekdays, provided the batteries are fully charged, and the weather is fine.

An indirect impact of running the telecentre solely on solar power was that training of new users would be difficult given that the limited hours the computers were available. Furthermore, since the tour operators would require the use of computers to sustain their businesses, the limited computer use would be provided to them first, as opposed to training of new users. In any case, if the power problem is not solved, the new users would also have little opportunity to use the computers. Thus, the power shortage problem has significantly affected the training of new users. (A recent project by Organization for Sustainable Engineering in South East Asian Nations (OSEAN), Cambridge University UK, UNIMAS, Bario Community, Engineers without Borders UK, has provided extra solar panels to generate enough power to run the telecentre for 6 hours, 6 days a week. Since then, more activities have been planned by eBario telecentre management)

Language of Resources. The contents of training manual and the materials that are available on the Internet are primarily in English, which are not understood by many people in the rural areas. In the eBario Project, an IT Literacy Training Programme in conjunction with a local company was introduced at the schools for teachers, students, and other members of the community. The project's trainer had already conducted one month intensive training programme in Bario. Although the members of the community had tremendous eagerness to learn, their little command of the English language, which undeniably is the ICTs language, presented a huge challenge to many of them. As such, the trainer had to redesign the present manual into a simplified manual and in Bahasa Malaysia. Additionally, the resources that are found on the Internet are mostly written in English, which pose a challenge for the rural people to comprehend due to their poor command of the English language.

Coordinated Approaches and Skilled Human Resources. The application of ICTs-based development efforts at community levels implies new skills and approaches from a variety of professions, some of which challenge traditional practices in several disciplines. The eBario Project is experimental in many ways. Nothing like it had been known to exist in Malaysia. The close working organisation of the multi-discipline research team and the harmonious relationships it has with the Bario community facilitated the progress of the project's goals. However, as a result of an analysis of the project's boundary partners, it was recognised that there was a wide range of institutions and individuals who were all potential stakeholders in the project and in what it potentially represented if it were to be replicated on a wider scale. As project implementers and promoters, the research team encountered a huge range of skills, disciplines and professions as part of its regular deliberations. Members had to be capable of associating and dealing with illiterate farmers, local administrators, technicians, small businessmen, officials, local and national community representatives, senior government officers and government ministers. Community benefits were identified that implied a range of agencies that needed to be mobilised and co-ordinated for such benefits to emerge. Thus, no single agency should carry responsibility or authority for community development with ICTs.

Awareness in Development of ICTs among Rural Communities. Although the Government of Malaysia has been aggressively promoting ICTs as one of the major components of its drive to fully developed nation status by the year 2020, the base-line survey indicated that 99.0 percent of the people in the Bario community had no knowledge of the Internet (Songan, et al., 2000). The significance of this emerged in the context that the Government has been promoting the advantages of the "k-economy" in which dependence on physical resources will give way to the exploitation of knowledge resources in the future development of the economy. Even though ICTs is the subject of a popular song frequently heard on the radio, which indicates a wholesale national commitment to ICTs, it was surprising, and a little alarming, to discover an entire community have heard little of such developments. Despite its remoteness and isolation, it seemed reasonable to suppose that Bario was not alone in this finding. A further research opportunity is provided by the need to discover how widespread this condition might be among other rural communities.

6 Major Outcomes (Benefits and Impact)

Numerous benefits were realized in the areas of education, and commerce. With the community's access to ICTs, there is an increased computer literacy among the students, teachers and community.

- The members of the community are able to communicate with the rest of the world using the telephones, and the Internet (via the VSATs). The members of the community, especially those who are involved in tourism have taken advantage of the ICTs - they are able to communicate with potential tourists directly via email, and confirm accommodation bookings online.
- The impact of the project has been felt at several levels, from the micro-level of the target community to the macro-level at the state and national level. Impact on the target community can be summed as follows: community resources in Bario have been mobilized towards achieving the project's goals. Individuals are continuing to participate in project maintenance. The community's project steering committee and a newly formed telecentre management community continue to oversee progress and nearly all influential members of the community are aware of the aims and potential of the project.
- A community telecentre has been established with ten computers, printers, a copier and a fax machine. Village secretaries usually use the centre to prepare meetings agenda, minutes and the like.
- The national telecommunications carrier, Telekom Malaysia, has installed four VSAT satellite dishes and equipment in Bario, which are now providing a satellite communications link to the telecentre and the school. Prior to the connection to the Internet, 6 public telephone booths were established, which have tremendous impact on the community's means to communicate with members of the community residing outside Bario. These have eased information flow in and out of Bario.
- The community has been sensitized to the capability of the technology and an agenda for development activity based on improved and technology-driven information delivery has been agreed to be implemented.
- The wider Kelabit community has also been alerted to the progress and potential of the project. Consisting generally of more educated individuals, the Kelabit Diaspora is a latent resource whose contribution to development in Bario is expected to be mobilised to considerable effect when connectivity is achieved.
- The research team and UNIMAS have become aware of the potential for rural development through the deployments of ICTs and the model of telecentre operation that seems capable of accomplishing its objectives. At the state level, the project has served to sensitize the Sarawak Government toward the potential for ICT-induced rural development, especially insofar as it has pointed to the importance of ICTs to isolated communities that are denied other forms of infrastructure. The Government of Malaysia is paying increasing attention to rural development. MIMOS Berhad, the organization that administers the National IT Council and the DAGS fund, is actively encouraging expansion of the project into other rural locations in Sarawak.
- In addition to the intended impact being achieved, and based on the research team observations, as well as comments from the Coordinator of the eBario Project in Bario, John Tarawe, the other impacts are as follows: (1) there has been an increase in the number of tourists; as of 1st October 2003, the number of flights to Bario has increased from 1 to 2 flights daily - partly due to more people having heard of eBario Project and in turn, Bario; (2) those involved in the tourist industry are using the Internet to attract, acquire as well as communicate with tourists; some are using the Internet to promote their trekking services (www.kelabit.net); and (3) there has been a reduction in rural-urban migration: more youths and their families are staying back in Bario running the tourist accommodation and tourist activities; there are now 7 lodges and 3 homestays.
- One of the biggest impacts has been on the improvement of lives of the Kelabits in Bario. One example of such impact is an anecdote related by the then Principal of the Bario Secondary School (refer to Appendix 1).

7 Critical Success Factors

The critical successful factors are gleaned from the experience of the eBario research team. While this list is not exhaustive, it is representative of the success factors as seen from many other similar projects

- 1. Focus on people, organisation, contents and processes rather than technology**

One major key to success is to focus on the very people that the ICTs are supposed to assist. In order for the ICTs to work, buy-in as well as a proper organisation structure needs to be put in place. The implementation of technology facilities is generally the easiest component to implement, the capability of changing of the mindset of the target community is more challenging but key to success.
- 2. Relevant to local needs**

The telecentre's existence and sustainability is tied to the ICTs' role in fulfilling the actual needs of the community. As such, the needs of the community have to be identified, to determine whether the technologies are necessary in the first place. By identifying the needs of the community, and that the ICTs are able to meet those needs, the motivation to adapt ICTs into the daily lives of the community would ensue.
- 3. Communities must be motivated in the first place**

The researchers' experience indicates that technology cannot function successfully without the community's aspiration and readiness to improve their own well-being. The best ICTs provided would not create a community's capacity, unless the community is interested in bettering themselves.
- 4. Community participation**

The members of the target community of the telecentre must participate in the whole process of setting the telecentres or any facilities. The community members are the ones who not only are aware of the needs of the community, but also the ones who will be managing the facilities in the long run. In general, NGOs, government bodies, and sponsors may be able to assist for the short periods (usually 1-2 years). Having local participation will ensure the facilities are continually operating.
- 5. Roles of local champions**

In the eBario Project, local champions are a key component in the success of the telecentre. These local champions are ideally members of the community and are passionate about helping their community to improve. These local champions serve as catalysts, motivators to the project, and perseveres through any set-backs. Local Champions: Poline Bala, the Team Leader, an anthropologist is a Kelabit and a member of the Bario community. Besides actively involved in the project, she played a very important role in building and maintaining the trust between the community and the team. John Tarawe, the eBario Project Coordinator in Bario was instrumental in motivating and sustaining the interest of the Bario community in the project. John played an active role in all aspects of the project, from the initiation right through to the implementation, and current operation and management of the telecentre. Mdm Lucy Bulan, Principal of the Secondary School in Bario also played a similar role at the school. She also motivated and encouraged both teachers and staff to become computer literate, and also to use computers in their classroom work.
- 6. Smart Partnerships**

Partnerships are required throughout the process of developing such rural community projects. The partners could be government bodies (which provide approvals, funding and advice) to NGOs (which provide human resource and training) to private companies (which may assist in the forms of sponsorship). In the case of the eBario Project, in addition to UNIMAS and the Bario community (which were the main instigator of the project), partners involved were the Marudi District Council (which provided approvals and the premises), government ministries, NGOs, and private companies (Comserv, and Telekom Malaysia).
- 7. Training programmes**

As the community will be running the telecentres, it must be prepared to be able to run the telecentre effectively and efficiently. Necessary skills, such as, management skills, computer literacy, maintenance skills are essential to the continued operation of the telecentres.

8. Business plan

In particular, for a telecentre that intends to be financially-dependent, it is necessary to have a business plan to be put in place. The business plans provides a description of the organisation, the objectives of the telecentre, how the objectives are to be achieved, the market of the business as well as financial forecasts and targets of earnings. In particular, the future success of the eBario project' sustainability is very much dependent on how well it designs, and implements its business plan. Unless it is expected that the government to provide funding to sustain the telecentre, it has to generate its own income.

9. Skilled community members

An often neglected component when providing ICTs to the rural communities is the presence of skilled community members who are able to maintain the technologies provided. These community members ensure that ICTs are running, and can troubleshoot problems without having to rely on assistance from the urban areas. Depending on technical support to fix ICTs problems in the cities may take days, needless to say, in the remote areas it may be weeks before any assistance arrives (if at all). In addition to strong technical members, it would seem that an entrepreneur is necessary to keep the telecentre running. It is this entrepreneur who will need to be able to follow through on the (aforementioned) business plan.

8 Current Status and Sustainability

The previous sections, in sum, described and detailed out the critical success factors derived from the eBario Project. This section provides details on efforts undertaken by the community and UNIMAS to maintain and sustain the online community, specifically, the telecentre. In particular, this section provides detail on the current situation and present activities being carried out at the telecentre to provide a context for the maintenance of the online community. Also, the ensuing sections will mainly focus on the telecentre, given that the Bario community is mainly involved in its operation, whereas the school is now able to get funding directly from the Ministry of Education. The handing over of the running of the School computer laboratory to the Ministry of Education, and the telecentre to the Bario community, respectively by UNIMAS was held in 2004. With this handover, the people of Bario take full ownership of the telecentre. UNIMAS would however still be in the background to provide assistance when required.

With the project now in its sixth year, the community is actively involved in identifying ways and means to sustain the telecentre. As a way to gradually introduce a "business model" and sustain the maintenance of the telecentre, members of the community are required to pay a nominal amount of money to use the computers at the telecentre; visitors are required to pay a higher rate. The eBario Project management committee intends to form a company, the eBario Sdn Bhd. The company will be involved, among other things, in making and selling of handicrafts to tourists. Also, the telecentre is providing Internet access via a wireless link to the clinic nearby. The telecentre technician also maintains the computer system in this clinic. As such, the Health Department will be paying the company for these services rendered. The income generated would be channelled back to the community for the maintenance and sustainability of the telecentre. Computers are now getting older, and may require an upgrade. In addition, the costs of the satellite communications link will come into play, once the initial 5-year payment of connection by the project to Telekom Malaysia Bhd ends.

Plans are underway to initiate eCommerce to allow the community to sell their products, such as handicrafts, and Bario rice (a popular and much sought-after fragrant rice grown in Bario) online. The community will participate in the development of the Website and will be trained in the maintenance of the website. Another avenue is eTourism - applying online technologies in promoting Bario Online. An initiative taken by UNIMAS and the Bario community is the www.bario.com website, which is currently being constructed - the website is maintained by a Kelabit family member in the UK and provides a portal to tourists interested in visiting Bario. At present, some members of the community are accepting online bookings for accommodation via email. As mentioned above, some of them are promoting their lodges on www.kelabit.net.

In addition, to the commercial nature of the telecentre, cultural preservation is also being studied. For example, exploring the cultural benefits of ICTs in stimulating the production, the protection and

popularization of Sarawak rural communities' oral traditions, as these traditions constitute part of indigenous knowledge system. Just like many other oral communities in Borneo, among the Kelabit, the traditional songs are important mediums to pass down their knowledge to the next generation. This project aims to record and transcribe some of these traditional songs, particularly the lakuh songs, which are songs composed by singers, usually women, in the Kelabit Highlands. These songs are recorded and/or transcribed and maintained on CD ROM and on a computer that is accessible via the Internet. The telecentre will also become the centre of repository of cultural knowledge to be shared by the community with the rest of the world.

9 Conclusions

The paper has outlined our noble experience in introducing ICTs to a remote community that has rudimentary capability for communication with the outside world compared to urban and other less isolated rural communities. Existing patterns of information demand and usage have been described. The survey results provide a background for continuing research into the effects of introducing greatly enhanced communications capability into the community in the form of the Internet, both as a direct connection to the secondary school and the telecentre, as a form of community service. Baseline data from a household survey coupled with data from interviews and focus groups have provided a socio-economic profile of the community as well as contribute towards an understanding of the priorities that the community places on new forms of information provision. This knowledge has helped us to develop new information systems for the community development and to track their impact and efficacy.

It hardly seems credible that among the rhetoric of the information age in which we live our daily lives that a community could be discovered for whom computers and the Internet mean nothing. On reflection, though, we cannot imagine that in this respect the Kelabit community of Bario is any different from thousands of similar societies in both rural and urban settings that have also been sidelined by the information revolution. From a research perspective, the study faces a particular challenge in raising the community's technology awareness above its zero base in its efforts to empower them with the knowledge building capacity that such awareness can bring. The additional challenge then emerges of ensuring appropriate forms of information can be provided to the community such that they are able to use it to improve their well-being. We have also shared some of the success that we accomplished through the implementation of the eBario Project, and the critical factors that led to this success. We hope that our research has shed light on how similar project elsewhere can reduce the digital divide, and include the majority populations of the developing world in the information revolution.

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Appendix 1: Excerpt of Speech By Madam Lucy Bulan on Impact of the eBario Project

One of the biggest impact of the eBario Project has been on the improvement of lives of the Kelabits in Bario. There has been many stories told, but one of these stories is in a form of a speech delivered by Madam Lucy Bulan, the Principal of SMK Bario during the launching of the eBario Project by the Minister of Telecommunication and Multimedia, Malaysia, YB Datuk Amar Leo Moggie. It shows how much lives have changed as a result of the eBario Project.

She says:

Ladies and gentlemen,

I had a dream. I dreamt of a tall tower reaching to the skies so that I could use the telephone to call my colleagues in Miri and Kuching. So that my staff and I need not missed six out of every ten meetings, or courses organized by the dept due to late postal delivery. So that I could talk in private to my superiors or personal family members without having everybody present at the radio-call center and others who had their radio-call sets or radios on listening in at the same time. So that I need not wait for as long as three hours to get a call through because the operator was always too busy in Penang. Having exhausted all my resources, I actually proposed in my heart to communicate directly to YB Datuk Amar, and went as far as your then Private Secretary, En Paul Kadang. In the end, the tower never materialized. Instead, God gave us a VSAT dish built close to the ground that could send signals far beyond the highest clouds.

*I dreamt of a computer club, not a sophisticated one but one with just 5-10 used computers - if only to teach students the keyboard. Having taught 20 years in Kuching, it burdened me that these rural students always started at a disadvantage when they left Bario. **We needed to bridge the gap between the shy, unexposed students and their aggressive, well-informed counterparts in town.** Today, we have been blessed beyond second hand computers to 15 of the latest models in the market. Every student attends compulsory computer classes and all the teachers are sacrificing time and effort to give voluntary training. To enhance students' appreciation, all students have to work on the padi fields every year, and the proceeds go to pay for club subscription, diskettes, stationery and ink.*

*You know folks, **many of the sick became worse and many of the bereaved never reached their loved ones in time because word always arrived too late.** Today, subject to availability of flights, we do make it in time. The only daughter of one of my staff was very ill last week. The flight turned back because of bad weather, like yesterday, but was persuaded to return in the afternoon when the weather cleared because thanks to the phone, we were able to communicate with the authorities concerned.*

***What does the future hold for us? Where do we go from here?** These things I mention not because we are not satisfied with what we now have. Our gratitude flows from the depth of our hearts. We are not worthy to receive such miracles; it can only be God's grace flowing through you all.*

Towards K-Readiness for Sarawak

by

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Abstract- *K-Readiness Index for Sarawak (KRIS) is a vital tool in gauging Sarawak's progress towards a knowledge-based society. Seventeen tools were reviewed and evaluated and from these, the concepts of K-World with a list of indicators of assessment were identified. The K-World encompasses 5 main thrust areas including K-Community, K-Economy, K-Learning, K-Public Services and K-Sovereignty. The questionnaires were distributed to seven areas in Sarawak namely Kuching, Miri, Sarikei, Matu, Lundu, Betong and Lawas for the pilot study. The results have shown that Sarawak falls under Stage 2 in terms the k-readiness. Kuching and Miri are much more prepared for knowledge-based society as compared to other districts. It was found that K-Learning and K-Community are the areas that need to be addressed by the State.*

Keywords: Knowledge-society readiness, Knowledge-community, Knowledge-economy, Knowledge-Learning, Knowledge-public services and Knowledge-sovereight.

1 Introduction

The state leadership has envisaged that the state of Sarawak will become a knowledge-society even before the year 2020. Sarawak is the largest state in Malaysia with a population that is sparsely distributed. About 50% of Sarawak's 2 million population resides in the rural areas where many of these areas are not accessible by roads. In addition, these areas do not have 24-hour electricity supply and treated water.

2 Background

A knowledge-society is vital for small and less developed countries to allow them to participate in a higher and more challenging globalised environment where they work collaboratively via a variety of technologies. In fact, knowledge becomes increasingly element, driving the growth and the way people live their lives. Moreover, the frontiers of knowledge are boundless, producing wealth for both entrepreneurs and economy for knowledge creation, commercialization and innovation.

Recognising the importance of a knowledge-based society, the State Information Technology and Resources Council (SITRC) provides the foundation and framework for the utilization of Information and Communications Technology (ICT) to transform Sarawak into a developed nation consistent with vision 2020. All ICT policies and programs by SITRC are in line with the National IT Agenda (NITA) vision, which utilizes ICTs to transform Malaysian society into an information society, then to a knowledge society and finally to a values-based knowledge society (as envisioned in vision 2020).

Therefore, ICT can be a weapon in the war against poverty. It offers great potential to empower people in less developed countries to overcome development obstacles and achieve economic viability and dependence.

The Economic Intelligence Unit anticipates a slight growth in the score of the Malaysian e-readiness index. In Malaysia the score of e-readiness has slightly improved to 5.61 in 2004 from 5.55 in 2003. The e-services factor is the major reason for Malaysia's increment which has skillfully transformed its technology manufacturing industry into a global source of IT service support and Internet-enabled customer care.

Since the status of k-society readiness is not known yet, the development of a K-readiness Index for Sarawak (KRIS) has become a necessity in measuring how far Sarawak is from achieving the status of a Knowledge based Society.

3 Realising a Vision

Vision 2020 envisages Malaysia to become a developed nation driven by a strong knowledge-based economy (k-economy) by the year 2020. In our aspiration to achieve this vision, care has to be taken to ensure that our culture and heritage will be preserved. The characteristics of the knowledge-based society are defined as:

Strong moral and ethical self regulatory and self managing empowered through information and knowledge based on the concept of the dignity of human kind (Vision 2020 Plan)

Therefore National IT Agen Council (NITA) identified five critical areas as followed that need to be addressed as strategy to migrate into the E-World.

- E-Community-participatory and inclusive governance processes for quality of life
- E-Economy-knowledge driven economy
- E-Learning-a life long learning culture
- E-Public Services-delivery mode of public goods and services; and
- E-Sovereignty-resilient national identity

The State leadership has envisaged that the State of Sarawak will become a knowledge society even before the year 2020. For Sarawak, the knowledge society would enable communities living throughout the State to have a broad and open global mindset while upholding our traditional way of life with access to the latest information, and living harmoniously with other communities worldwide.

The concept of K-World is thus derived and subsumed from the NITA's E-World which in deemed essential for Sarawak's development towards a K-Society.

4 K-World Sarawak

K-World Sarawak is identified and employed to determine the readiness of the State of Sarawak in achieving a k-society, which comprises five thrust areas including K-Community, K-Economy, K-Learning, K-Public Services and K-Sovereignty (refer Figure 1).

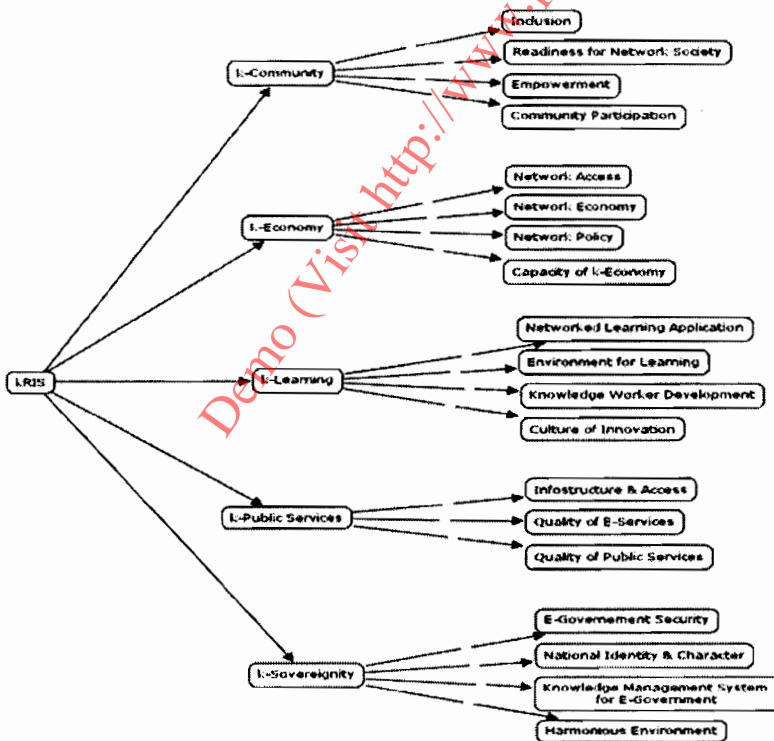


Figure 1. Overall Structure of Knowledge Readiness Index For Sarawak Measurement Tool

K-Community has been identified as one of the areas to be monitored with the strong emphasis given by the Malaysian Government in transforming the society into a value-based knowledge society. Since the advancement and well being of a nation very much depends on its citizens, the emphasis placed on the community is also emphasized in KRIS. In order to measure Sarawak's state of readiness for K-Community, four major indicators are to be examined: inclusion, readiness for network society, empowerment, and community participation.

K-Economy can be define as using knowledge to produce economic benefits. In K-Economy, knowledge and information are shared and will grow through application. Knowledge and people skills account for the biggest asset in K-Economy. There are four major indicators in measuring Sarawak's state of readiness for K-Economy: Capacity of K-Economy, Network Economy, Network access and network policy.

K-Learning focuses on enhancing continuous and lifelong learning via electronic interaction towards creating an information and knowledge based society. Areas that have been identified to indicate the K-Learning progress are Networked Learning Application, Environment for Learning, Knowledge Worker Development and Culture of Innovation.

K-Public Services enquires the Public, Private and Community Sectors to work together in order to provide a people-oriented, customer focused services electronically. This thrust area facilitates continuous improvement on the electronic delivery of public goods and services in order to meet current and future demands of customers. The K-Public Services focused on the areas namely: Quality of Public Services, Quality of e-Services and Infostructure & Access.

K-Sovereignty is the most constructive manner in which the nation can secure and enhance its sovereignty in the cyberworld. By focusing on building a resilient national identity, it is envisioned that citizens and institutions zero in towards enhancing national identity, integrity and societal stability in the face of borderless challenges to nation. There are four components to be measured including E-Government Security, National Identity, Knowledge Management System for E-Government and Harmonious Environment.

5 Methodology

5.1 Project

The project is to measure the k-readiness of Sarawak divided into 3 phases. The Phase I covered the development of the KRIS tool. The phase II involved the collection of information from the CIOs at the district level, agencies and government organizations. At the grassroots level, Phase III covered data collection from seven districts.

5.2 Indicators for the assessment

These following 17 assessment tools have been developed to measure a country's readiness worldwide. See Table 1 below. The tools used widely-varying definitions for E-Readiness and the assessments vary considerably in their goals and results.

Table 1 : List of indicators of existing assessment tools

No	Study	Focus	Indicators
1	Asia Pacific Economic Cooperation (APEC)	E-Commerce Readiness	<ul style="list-style-type: none"> • Basic infrastructure and technology • Access to necessary services • Current level and type of use of the internet • Promotion and facilitation activities • Skills and human resources • Positioning for the digital economy
2	Centre International pour le Dveloppement de l'Inforoute en Francais (CIDIF)	Internet Service Market	<ul style="list-style-type: none"> • Internationalization • Localization • Adaptations of software and internet applications
3	Computer Systems Policy Project (CSPP)	Existing Infrastructure	<ul style="list-style-type: none"> • Infrastructure • Access • Applications and services • Economy • Enablers (policy, privacy, security and ubiquity)
4	Economist Intelligence Unit (EIU)	E-Business Readiness	<ul style="list-style-type: none"> • Connectivity • Business Environment • E-commerce Consumer and Business Adoption • Legal and regulatory environment • Supporting e-services • Social and cultural infrastructure
5	Information Society Index (IDC)	Infrastructure	<ul style="list-style-type: none"> • Computer infrastructure • Information infrastructure • Internet infrastructure • Social infrastructure
6	World Bank, Knowledge Assessment Matrix (KAM)	K-Economy	<ul style="list-style-type: none"> • Performance indicator • Economic incentives and institutional regimes • Education and human resources • Innovative system • Information infrastructure
7	McConnel International (MI)	Infrastructure, Digital Economy, Education and Government	<ul style="list-style-type: none"> • Connectivity (infrastructure, access and pricing) • E-leadership (government policies and regulations) • Information security (intellectual property, privacy, electronic signatures) • Human capital (ICT education, available skilled workforce) • E-business climate (competition, political and financial stability, foreign investment, financial infrastructure)
8	Metric Net (MN)	E-Economy	<ul style="list-style-type: none"> • Knowledge jobs • Globalization • Economic dynamism and competition • Transformation to a digital economy • Technological innovation capacity
9	Mosaic Group (MQ)	Internet-Questionnaire Based Assessment	<ul style="list-style-type: none"> • Pervasiveness (Per capita usage) • Geographic dispersion • Sectoral absorption (usage within major sectors of the economy) • Connectivity infrastructure • Organizational infrastructure (the state of the Internet service market) • Sophistication of use
10	Network Readiness Index (NRI)	Infrastructure, E-Society, Policies, Digital Economy, Business and Government	<ul style="list-style-type: none"> • Environment (Market, Political and Regulatory, Infrastructure) • Readiness (Individual Readiness, Business Readiness, Government Readiness)

11	Center for International Development (CID)	Society	<ul style="list-style-type: none"> • Network access • Network learning • Network society • Network economy • Network policy
12	University of Maryland (CIDCM)	Qualitative Assessment based on past performance and current internet pervasiveness	<ul style="list-style-type: none"> • Background and history • Key players in internet development • Internet development and ICT policy over time • Negotiations between players in developing the country's internet
13	International Telecommunication Union (ITU)	Telecom	<ul style="list-style-type: none"> • Technology implementation • Capacity building • Policies and strategies • Partnership/alliances
14	Mosaic	Internet-Detailed Case Studies	<ul style="list-style-type: none"> • Pervasiveness (Per capita usage) • Geographic dispersion • Sectoral absorption (usage within major sectors of the economy) • Connectivity infrastructure • Organizational infrastructure (the state of the Internet service market) • Sophistication of use
15	Swedish International Development Cooperation Agency (SIDA)	Mainly SWOT analysis of a Nation	<ul style="list-style-type: none"> • Network access • Networked learning • Networked society • Networked economy • Network policy
16	US Agency for International Development (USAID)	Access, Government and People	<ul style="list-style-type: none"> • ICT infrastructure & technology in use • Legal/regulatory/policy environment • Private sector & NGO • Human capital
17	Human Development Report	Longevity, knowledge, and a decent standard of living.	<ul style="list-style-type: none"> • Networked economy • Networked learning • Networked society • Human capital • Crime • Health issues

After scrutinizing these indicators critically, there is a need to ensure that the measurement (tool as an indicator of a comprehensive k-society) to take into consideration the social stability and balance of the nation. Therefore, indicators to be included in the measurement process, should not only focus on innovation and, social aspects but also the values integration within the society. It was decided to review, analyse and customize relevant from the 17 tools' indicators to suit The Sarawak study.

5.3 Calculation of Indexes

The indexes of the various states are calculated based on weights and index levels of the indicators. There are four levels as mentioned in the earlier section: Stages 1 through 4. For each of the 5 thrust areas for each district, the levels are calculated based on this formula.

$$\text{Level 4 Index} = (\text{weight} \times \text{indicator's index}) / (\text{weight}) \quad (1)$$

$$\text{Level 3 Index} = (\text{weight} \times \text{Level 4 index}) / (\text{weight}) \quad (2)$$

$$\text{Level 2 Index} = (\text{weight} \times \text{Level 3 index}) / (\text{weight}) \quad (3)$$

$$\text{Level 1 Index} = (\text{weight} \times \text{Level 2 index}) / (\text{weight}) \quad (4)$$

$$\text{KRIS} = \text{Level 1 index for all 5 thrust areas for all the districts} / \text{Number of districts} \quad (5)$$

6 Findings

The study have shown that the Sarawak State is progressively moving ahead towards a knowledge-society. The model of K-World has been produced in measuring the readiness of Sarawak participating in knowledge-based activities. The findings indicates that Sarawak is moving towards Level 2 according to the KRIS index. Generally, the members of the society are prepared for k-society whereas some efforts have been undertaken to prepare the state to become a knowledge-society. Even though a conducive environment for promoting knowledge-society is being planned knowledge-based activities have not yet been assimilated into the daily lives. However, strategic plans, mechanisms and infrastructures are in place to obtain knowledge-society status.

The findings highlight that the K-Learning and K-Community are the thrust areas that need to be addressed by the State. In the area of K-Learning, not all educational levels are provided with computers but if there is any, most of them are being used for administrative purposes only (as identified in the indicator Environment For Learning). The training programme are not available in the community to promote the culture of lifelong learning. The other important main indicator such as k-worker development is low at the KRIS index where the k-worker development programme are not in place to support the community. Whilst, in the area of K-Community, the study has found that the members of the community do not normally employ ICTs in their everyday lives. Moreover, the environment for promoting k-based activities is minimal. In the case of Sarawak, the ICT facilities for disabled are rarely found in the public areas (to facilitate them to access ICT needs). Like K-Learning and K-Community, the result has shown that quality of public services was low especially in rural communities. The public services that has been provided by the State is still inaccessible in certain areas such as health service and basic public services (i.e. electricity, water).

In the area of K-Economy, progress has been made in order to achieve a knowledge-driven economy where formal and informal networks are available in order to create value and wealth in the emerging economy. The other important thrust area namely K-Sovereignty has shown some positive progress towards knowledge-society. For example the citizens have sovereignty values and they are aware of their roles in building national identity, integrity and promoting

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