Strategies for Information Communication and Technology (ICT) Adoption in Rural Areas

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ABSTRACT

ICT has been recognized as a powerful tool for a country's development. The focus of the study is to identify the current level of ICT adoption in the rural areas, the challenges the local agencies faced in delivering public services, and to recommend next course of action to improve the adoption of ICT. Twenty-two villages were involved in the study with total of 922 respondents. Fieldworks were carried out involving questionnaires and interviews. The findings show that ICT adoption in the rural communities is still very minimal and at its early stage. The use of computer and Internet is quite low, and their awareness on public online applications is very minimal. Among the challenges faced by the local government agencies are: (i) limited manpower to support the operation, (ii) problems when dealing with customers, (iii) lack of cooperation from the community, and (iv) limited resources. They are also instances where the agencies face with infrastructural problems such as interruption of network services. To enhance ICT adoption in rural areas and to increase the public services delivery, some recommendations are put forth as strategies to be carried out by the state government.

Keywords
ICT Adoption, ICT strategy, rural areas

1.0 INTRODUCTION

The states of Kedah, Perlis, Terengganu, Kelantan, Pahang, Sabah and Sarawak are among the states in Malaysia that have more than 50.0% of their people live in rural areas (Shaari, 2001). In the state of Kedah for example, 61.3% of its population resides in the rural areas and engage in agricultural based economic activities. In light of this, these states are reported to have been left behind in ICT development as compared to other states (SKMM, 2007). A high digital divide is therefore transpired in these states especially between rural communities and those who live in urban.

As Malaysia moves toward becoming a developed nation by 2020, and in response to this, most states devised their own strategies for the development of ICT as ICT is strongly believed to enable a country to transform into a fully developed nation (Kuppusamy & Santhapparaj, 2005). Without any exception, the state of Kedah drew the *Pelan Strategik ICT Kedah Maju 2010* (ICT Strategic Plans for Kedah Maju 2010) to support the nation's vision. The plan draws five objectives with few strategies designed for each objective. One of the objectives is to allow her citizens to have high knowledge and skills in ICT. Currently, Kedah has successfully realized these objectives into (i) the development of Multimedia Super Corridor (MSC) Cyber City in Kulim Hi-Tech Park, (ii) the development of human resource ICT development program to produce knowledge workers through the establishment of Kedah Institute of Management, and (iii) setting up an effective management of ICT through Kedah ICT Holding, which now has been privatized.

The current and latest statistics on the adoption level of ICT among the rural communities are very important to the state government in implementing, monitoring and controlling the three strategies given earlier. Thus, a study was conducted to gather the current level of ICT adoption in Kedah and therefore to recommend next course of action to improve the adoption and utilization of ICT. It is the hope that this study would be able to identify suitable strategies for ICT adoption in the rural areas and help less developing state governments to use ICT as means to improve public service delivery.

2.0 LITERATURE REVIEWS

Technology is an influential tool in community development. ICT is perceived as enablers of technological and societal change towards sustainable development. In line with this, studies

have recommended that the government should encourage the use of technology among her citizen and to focus on the use of technology to achieve the country's development objectives (Prasad, 2001; Meng & Li, 2002; Kozma, 2005). Hence, the government should be committed and willing to invest in ICT in order to achieve the objectives. This is to ensure that the development of the country can persist and the underserved community has the potential to upgrade their live and well-being.

A research carried out by the United Nation Development Program (UNDP, 2006) found that there exist a high correlation between the Human Development Index (HDI) and the Internet usage. This means that the higher the Internet usage, the higher the HDI. HDI is used by the UNDP to measure the life-expectancy rate, literacy level, education level, and the standard of living in countries around the world. As a comparison, the Malaysia Communication and Multimedia Commission (SKMM) found that the internet penetration rate in capital city, Kuala Lumpur, was close to 40.0%, whereas the internet penetration rate in Kedah was 7.0%, ie. below the national average of 12.0% (SKMM, 2006). Latest study conducted by a group of UUM researchers, however found a lower internet penetration at the rate of 4.0% in the rural areas of Kedah (Zulkhairi et al., 2008). In addition, broadband penetration was even lower with less than 1.0% when compared to with the recently announced national broadband penetration, at the rate of 33.2% (Utusan Malaysia, 2010).

ICT strategic plan is an important document that describes the direction one needs to take in the implementation and usage of ICT to support an organisation's vision, mission and strategic objectives. In the context of a state or country, such plan do exist and in the case of Malaysia, the National IT Agenda (NITA) have been in existence since 1990s. Ever since the Seventh Malaysia Plan (1995 – 1999), Malaysia has realized the importance of creating an information rich society, and ICT has been identified as a catalyst that would be able to boost up the progress of nation building in-line with the aspiration of a fully developed country.

In the Nineth Malaysia Plan, a total of RM12.9 billion was allocated for ICT-based programs and projects. As a result, people from all walks of life now are able to enjoy the provided ICT facilities. Therefore, ICT usage needs to be intensified particularly in the rural areas to allow everyone to benefit from the development. This in turn will contribute to the well-being of the society. The earlier stage of ICT development in Malaysia focused on the urban area particularly major cities. This has resulted in imbalanced ICT development not only between the urban and the rural areas, but also within small towns. This phenomenon is referred to as digital divide. Areas that fall in this category are also referred to as underserved areas.

2.1 Digital Divide

Digital divide is usually affected among the indigenious groups that are relatively poor and less educated. These groups mainly reside in rural areas. A study on selected villages in Kedah and Perlis in 2008 has shown that ICT penetration and usage programs have not been very successful. Most respondents do not have computers, and have zero or little basic ICT knowledge and skills, and some of them are not aware of the existence of online applications (Zulkhairi, et al., 2008).
Efforts are needed to increase the ICT facilities and infrastructures especially in rural areas in Kedah in order to bridge the digital divide.

2.2 ICT Development in Kedah

The state of Kedah is relatively less developed economically compared to other states in Malaysia. According to SKMM (2006) report, computer ownership and internet penetration in Kedah is less than the national average. The overall ICT development in Kedah is still at its infancy and much more can be done to further develop ICT in the state both in the public and private. However, despite the lack of ICT development at the state level, federal public agencies has boost up the ICT development which several online services made available by the related agencies to the public at the state level. Among the widely used applications are e-Hasil, UPU Online, PTPTN, e-Saman, e-peperiksaan, MyEG (for e-government services), and e-Kasih.

It is the intention of this paper to present an outlook of the ICT adoption level in Kedah in order to formulate suitable ICT strategies to increase the adoption. As suggested by (Gichoya, 2005), some factors that could encourage or reinforce the successful adoption of ICT projects could be (i) vision and strategy, (ii) government support, (iii) external pressure and donor support, (iv) rising consumer expectations, and (v) technological change, modernization, and globalization.

3.0 METHODOLOGY

This study was conducted on all districts in the state of Kedah. The districts are Kulim, Bandar Baharu, Yan, Kota Setar, Kubang Pasu, Kuala Muda, Padang Terap, Langkawi, Sik, Baling, and Pendang. Two villages were selected from each district. Questionnaires were distributed to the rural communities in each village. The instruments consist of Set A (Profile of Respondents, ICT

Knowledge and Usage) and Set B (Information Needs and Information Flow).

Apart from questionnaires, this study also involved conducting interviews held in the nine districts with the participation of 18 agencies under the state goverment. This includes Jabatan Agama, Jabatan Alam Sekitar, Jabatan Kebajikan Masyarakat, Jabatan Pertanian, Jabatan Bekalan Air, Jabatan Kerja Raya, Jabatan Pengaliran dan Saliran, Majlis Daerah, Pejabat Ahli Dewan Undangan Negeri, Pejabat Daerah, Pejabat Penerangan, Pejabat Penghulu, Pejabat Perhutanan, Pejabat Tanah, Pejabat Veterinar, Pejabat Zakat, Perbadanan Perpustakaan Awam and Pertubuhan Peladang. Among the items asked during the interview were (i) the challenges and obstacles faced by the respective agencies when dealing with the public and other agencies, and (ii) the critical information needed to accomplish the stipulated tasks efficiently.

4. 0 FINDINGS AND DISCUSSIONS

4.1 Demography

A total of 922 respondents have participated in this study. Table 1 shows the number of respondents according to districts. The range of the respondents is quite evenly distributed across the districts with the exception of Pendang which has the highest number of respondents close to 20.0% of the total respondents. Of the 12 districts (Pokok Sena is a newly created district separated from Kota Setar), the two major cities (Alor Setar and Sungai Petani) are situated in the districts of Kota Setar and Kuala Muda.

Table 1: Respondents According to Districts

Districts	No. of Respondents	%
Kulim	38	4.1
Bandar Baharu	55	6.0
Yan	82	8.9
Kuala Muda	80	8.7
Langkawi	67	7.3
Padang Terap	89	9.7
Kubang Pasu	40	4.3
Kota Setar	72	7.8
Pendang	182	19.7
Baling	101	11.0
Sik	77	8.4
Not mention	39	4.2
Total	922	100

Most of the respondents (61.6%) are 40 years old and above while 24.7% are those below 30 years old. In terms of gender, 55.4% are female and 44.6% are male. Almost all of the respondents are Malay. Majority of the respondents (46.0%) have their highest education up to secondary schools, while only 3.1 % received education from institution of higher learning. Most respondents indicated their occupation as self-employed and housewives. Table 2 lists the respondents according to their occupation.

Table 2: Occupations of respondents

Job/Main Activity	No. of respondents	%
Public sector	40	4.3
Private sector	37	4.0
Business	33	3.6
Students	156	16.9
Housewife	252	27.3
Self-employed	216	23.4
Unemployed	77	8.4
Pensioner	30	3.3
Others	67	7.3
No answer	14	1.5
Total	922	100

About 8.0% of the respondents are doing part-time jobs such as being contractors, fishermen, rubber tappers, tailors and paddy farmer. A significant number of the people in rural areas belong to the low income group. In this study, 30.3% have income less than RM416; the highest group among them. It is followed with a group whose income is in between RM417 to RM676 (29.6%), and 4.2% with those of RM677 to RM1500. Only 5.6% have income higher than RM1500.

4.2 Computer Usage and Ownership

The study shows that majority of the respondents, 668 people (72.5%) have never used computer in their life. Only 238 respondents (25.8%) have experienced using computer while the rest (1.7%) did not give any answer. Several reasons were identified to explain why the respondents never use computer (Table 3). A total of 550 respondents (59.7%) do not have computer, 143 respondents (15.5%) feel that they have no needs to have computer, while 102 respondents (11.1%) have no interests in using computer. Other reason for not using computer is feeling afraid to use computer (7.6%), do not have skills, and unaffordable to purchase a computer (6.0%).

Table 3: Reasons Why Never Use Computer

Reasons	%
Do not have computer	59.7
Have no needs	15.6
No interests	11.1
Afraid to use computer	7.6
Others	6.0

Increasing computer ownership could be one strategy to increase the use of computers in the community. This is evidence from the preceding findings that not owning computer being the main reason for not using computer. In terms of computer ownership, the findings show that only 71 respondents (7.7%) have computer at home while 90 respondents (9.8%) do not have. This finding suggests that those who refused to respond to the computer ownership question do not own computer. These are illustrated in Figure 1.0.

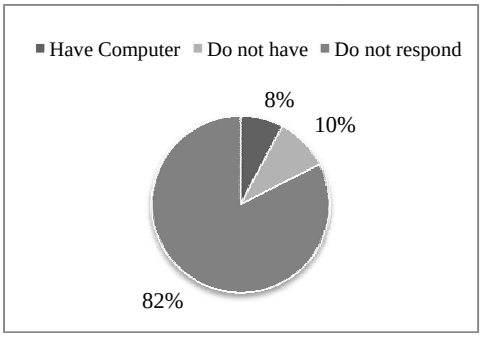

Figure 1: Computer Ownership

The study also attempted to identify the number of years the respondents use computer. Of those who have used computers, about 10.2% indicates its usage for less than a year, 4.6% between one to three years, while the rest (11.8%) have experienced using computer more than four years (Table 4). More than half (73.4%) however did not reveal how long they have used computer.

Table 4: Years Using Computer

Years Using Computer	%
Less than 1 year	10.2
1-3 years	4.6
4-6 years	5.0
More than 6 years	6.8
Did not answer	73.4

4.3 Internet Usage

As part of understanding ICT adoption among the rural communities, the study also surveyed the usage of Internet and the reasons for not using it. Of the total respondents (922), only 161 respondents (17.5%) have the experience of using the Internet. They accessed the Internet from various places, for instance from cyber café, school, home, and library as indicated in Table 5. From the table, it is evident that cyber café seems to be the most popular place to access to the Internet (6.5%).

Table 5: Places to Access Internet

Places	No of Respondents	%
Never use Internet	761	82.5
Cyber café	60	6.5
School	28	3.0
Home	27	2.9
Library	21	2.3
Work Place	21	2.3
College/University	4	0.4
Total	922	100

Further investigation shows that the main reason for not using Internet is they do not have connection to Internet. From 71 respondents who have computers at home, only 25 respondents have internet connection. About 56.0% of them use broadband technology while 44.0% uses dial-up for the connection. Other reasons being indicated for the low usage of Internet are: (i) do not have interest, (ii) having little knowledge to use Internet, and (iii) can not afford to pay for the Internet connection.

In terms of years using Internet, out of the 77 responses using Internet, most of the respondents (39.0%) have 1 to 3 years experience while 28.6% has started using the Internet in less than a year. Only 16.9% have used more than six years. In addition, the study also identified the frequency of accessing the Internet in a week. As shown in Table 6, out of 80 responses, the highest number of use in a week is 3 to 5 times (15.0%), and followed by more than eight times in a week (12.5%). However, most of the respondents (52.5%) seldom used the Internet.

Table 6: Time Use Internet in a Week

Time in a week	%
Seldom	52.5
1-2	10.0
3-5	15.0
6-8	10.0
More than 8	12.5

4.4 Knowledge of Online Applications

In terms of online applications usage, surprisingly more than 90.0% respondents are not aware of their existence with the exception of online games. This may imply the lack of public awareness of the existence of ICT application and content despite the existence of such applications that meet their needs. Details of the responses are tabulated in Table 7.

Table 7: Awareness and Use of Online Applications

Type of Application	Awareness/ Use	No. of Respondents	%
e-Hasil	Aware	27	2.9
	Use	8	0.9
	Not aware	887	96.2
UPU Online	Aware	27	2.9
	Use	20	2.2
	Not aware	875	94.9
PTPTN	Aware	33	3.6
	Use	12	1.3
	Not aware	877	95.1
e- Saman	Aware	31	3.4
	Use	10	1.1
	Not aware	881	95.6
e-Peperiksaan	Aware	31	3.4
	Use	15	1.6
	Not aware	876	95
e-mail	Aware	29	3.1
	Use	48	5.2
	Not aware	845	91.6
Online Game	Aware	31	3.4
	Use	111	12
	Not aware	780	84.6
Internet Banking	Aware	20	2.2
	Use	33	3.6
	Not aware	869	94.3

Thus, as part of studying ICT adoption among rural communities in Kedah, this study made an effort to identify whether these communities are aware of the existence of those applications, and whether they have used any of the applications. In general, rural communities have minimum awareness on the existence of the online applications. Majority of them (as shaded in Table 7) are not aware of the online applications available through the Internet. Among the applications, PTPTN is the most known by the respondents (3.6%), followed by e-Peperiksaan, e-Saman, and online game with each 3.4%, e-mail (3.1%), UPU Online and e-Hasil, each 2.9%, and Internet Banking (2.2%). The percentage of using those applications, as shown in Table 7, is very low. The most used applications are online game (12%), e-mail (5.2%), Internet Banking (3.6%), and UPU Online (2.2%). Other than the applications listed in Table 7, a small number of respondents stated that they also know and use online dictionary, online news paper, job searching application, and social networking application such as Face book, My Space, Friendster and Twitter .

4.5 State Agencies: Challenges, Obstacles, and Critical Information Needs

This study has also identified the challenges, obstacles, and information needs of the various state government agencies (as listed in Section 3 of this paper). The purpose is to identify the information needs that can support the state ICT strategic plan.

Among the challenges faced by these agencies are: (i) limited manpower to support the operation, (ii) problems when dealing with customers, (iii) lack of cooperation from the community, and (iv) limited resources. They are also instances where the agencies face with infrastructural problems such as interruption of network services. Agencies also faced with the problems of public awareness of the procedures and functions of the agencies. These will result in the difficulty for the public to deal with the agencies concern thereby affecting the performance of the agency in providing good delivery of services.

Critical information needs are also gathered from the agencies. These are summarized in Table 8. Among the critical information needs are regarding licenses, land matters, diseases, and revenue and assets.

Table 8: Critical Information Needs

Category	**Critical Information**	Reasons Needed
Agency	• Information about assets from Pejabat Tanah • Information about license • Information about smuggling	• To identify premises that do not have license
Public	• Land information including lot number, & topology map) • GPS data • Information about road accident • Information about single parent from Jabatan Agama • Information about target group • Information about size of land and type of animal breeding) • Information about owner of deserted land • Information about income and assets of applicant • Information about squatters • Information about land slide • Information about	• To help officer speed up information processing • To plan for natural disaster recovery • To support consultation processes • To support planning Statistics of water pressure in th future • Hard to detect • Wrong information on the status of single parent • To expedite the distribution of aid to the

	water pressure for a new project • Information about epidemic	target group • To prepare financial proposal • For fast action

4.0 CONCLUSION AND RECOMMENDATION

Having all the problems as discussed in the previous section, as a state, Kedah is facing more challenge in incorporating ICT to her citizens. In order to move forward, a top-down strategy need to be adopted, and the state government needs to continously make an effort to enhance the usage of ICT among the people of Kedah.

Most of the recommendations put forward are based on this top-down strategy. Having had the critical information need from both the agencies and the public, we believe that the state government of Kedah need to strategize the implementation the ICT infrastructure as the main ICT development agenda.

1. Using the strength of agricultural-based industry, especially in biotechnology, aquaculture and animal-breeding, the state of Kedah should exploit ICT and multimedia in helping the local industries (mainly small and medium industries) to reach the global market. The exploitation of internet technology to expand the market possibility of those products should be explored further. A better design of product packaging, presentation and marketing should be introduced. In relation with this, a system that is based on the e-brokerage concept can be developed and implemented to benefit the farmers and fishermen to do away with middleman. The system should incorporate data related to farming and fishery and present this using an electronic dashboard. The realization of these concepts will help the players in the industries to maximize their return.
2. To further improve the status of Kedah as the Rice Bowl of Malaysia, the usage of ICT should be expanded to increase the paddy yield. A precision control and monitoring system should be implemented to maximize the usage of land, irrigation system, and management of environment. A sensory and satellite technology can be adopted to increase the per hectar yield such as supervisory control and data acquisition (SCADA) system can be used to monitor the growth and production of paddy.
3. The state of Kedah needs to continously and seriously implement public access internet centre (telecentre) all over the state in order to create knowledge-based community and to bridge digital divide. The telecentre should work as a one stop centre where community from all villages can use it to access to varieties of useful and reliable information regarding villages, communities and their activities. One telecentre can be linked to other telecentres to create “e-society” in Kedah that would further encourage community participation. To optimimize ICT benefits, the basic infrostructure for telecentre including computer, database, and internet services must be well provided and be integrated with e-Masjid and e-Surau. The promotion of the roles and benefits of telecentre to community must be continously communicated to all people. With good infostructure and effective marketing, community will be aware about what they can benefit from the centres. The implementation of e-government and e-business that involve G-to-C (Government to Consumer) dan B-to-C (Business to Consumer) thus can be effectively realized by the community from time to time. There is a need for the state government to coordinate the implementation of telecentres activities involving all stakeholders concerned. Various federal government agencies, private sectors, and the state can sit together to formulate the strategy to enhance ICT adoption especially among rural communties. Entities such as Pejabat Daerah, Community Committee (JKKK), local associations can collaborate to increase the awareness of the communities to the existence of telecentre in the community.
4. Another strategy to increase the adoption of ICT in Kedah is through the implementation and sharing of ICT services (Shared ICT Services) between the government agencies and private sectors at the state and federal level. This effort will ensure that services to public will be performed sistematically and professionally and delivered efficiently across the country. The synergy between Shared ICT Services and Business Process Outsourcing (BPO) will not only reduce the operating costs at the related agencies but also will increase revenue generation of the state government, especially with the involvement of private sectors and multinational companies.
5. The establishment of Kulim as Cyber City has expanded the effort of MSC in the northern area. More initiatives can be done, for instance through a collaboration between ICT industries and private companies and IHLs in Kedah, to continue the development of the MSC so that its benefits can also be shared and appreciated by all communities in Kedah. This is important to balance the growth of ICT industry which is currently concentrated in the southern part of Kedah.
6. One of the challenges identified in the state government agencies is the limited manpower

to support the ICT operations. Not all agencies in Kedah have ICT officer to help planning and implementing ICT development at the local level. The state and federal government should recruit ICT officer for each agency as a strategy to support ICT adoption at the level of agency, and local communities. As part of the roles, ICT officer can engage in research and development activities to identify future IT projects to connect agencies, local communities, and businesses especially in connection with an efficient and effective public delivery services. The roles of ICT officer can be included as part of the planning in Shared ICT Services and BPO. In addition, the existing officers can also be re-trained with ICT-related skills to anticipate the changes that accompany ICT structure and new roles.

In summary, the state government should continously explore the high impact ICT-related programs and give full commitment to ensure the success of the taken initiative. The state government must gain supports and resources within and outside the state government. The state governmnet should make the most of the support and resources provided by Federal government, private agencies, ICT experts from within and outside the country to ensure the success of the ICT programs. In order to strategize the ICT implemention in Kedah, ICT programs must fulfill two important criteria: to drive the physical and economic development to be at par with other state in Malaysia, and exploiting the available strengths to further develop ICT area within that strengh.

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