

Sustainability Criteria Model: A Field Study of ICT4D Project

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Abstract

Community ICT hubs provision in rural areas has been recognised as a promising tool to improve ICT literacy especially in developing regions. However, there are particular challenges in sustainable community ICT hubs provision that lead to low success rates and consequently derive economical, institutional, social, and cultural aspects consideration. The purpose of this study is to identify and understand the sustainability criteria of community ICT hubs implemented at 9 districts in one of the most progressive states in Malaysia. This study uses case study as a strategy to collect its qualitative data through document review, observation, and interview involving 92 respondents. There are 8 sustainability criteria discovered, grouped within 3 sustainability dimensions: social/cultural; economical; and institutional.

Keywords: Community ICT Hubs, ICT Sustainability, ICT4D, Sustainability Dimensions.

1. Introduction

Continually dropping prices of information and communications technology (ICT), and continually increasing ubiquitous ICT power, have created an environment where ICT literacy is vital for competing effectively in a globalised world. In achieving the Millennium Development Goals (MDGs), most governments around the world have proposed rural environments ICTs to ensure that the benefits of new technologies especially information and communication technologies are available to all. Several initiatives born within civil organisations, universities, and research institutes have developed specific low-cost computers, wireless communication infrastructures, and open-source software to be used in such environments. However, ICT initiatives in developing countries have shown low success rates in terms of sustainability [1]. *Pusat Siber Rakyat* (PSR) was introduced by one of the most progressive states in Malaysia, to support community development and to bridge the digital divide through the use of communication and computing technology. This PSR is another community ICT hub for citizen. However, after its 10 years in operations, only 19% were sustained, while the

other 81% failed to sustain as they were, among other reasons, not fully utilised, abandoned or totally closed. This study is derived from [2] where its aim is to identify and understand the sustainability criteria of community ICT hubs in developing countries with reference to Malaysia.

1.1 ICT for Development

There is growing optimism that technology, particularly information and communication technologies (ICTs), can help achieve development goals and spur progress in developing countries. It is agreed by many researchers that there is a consensus that ICTs can play an important role in development, for examples by connecting people to more accurate and up-to-date information, equipping them with new skills, and connecting them to an international market. ICT for development (ICT4D) project is similar to conventional projects in that they are transitory undertakings that use resources, incur costs, expected to produce deliverables over a period of time, and typically have a high rate of failure. In ICT4D project, ICT-based solutions are developed to meet needs or to address a problem. These projects improve processes and methodologies in the scope of ICT. Moreover, these projects also introduce technological changes in organisations that are intended to be beneficial to the organisations and their target groups.

The evolution of ICT4D has three phases: ICT4D 0.0, 1.0, and 2.0 [3]. In the first phase, until about 1990, computers were used in government administration and by multinationals to foster economic growth. From the mid-1990s onwards, ICT4D 1.0 started as development actors such as the World Bank called for the adoption of ICTs as a tool for development – a call which was in response to the growth of the Internet and the adoption of the Millennium Development Goals (MDGs). Due to the need for a rapid response to the plight of poor, rural communities, a popular choice was the deployment of

telecentres or community ICT hubs to deliver information, communication, and various services.

1.2 The Concept of Sustainability

Sustainability is a concept and strategy for integrating and balancing three bottom lines (TBL) namely, economic, environmental, and social dimensions [4] into a specific domain, while sustainable development is defined as a process of achieving sustainability. However, this definition is rather broad and difficult for organisations to understand and apply. As a result, much of the focuses on sustainable development tend towards an ecological perspective without explicit incorporation of the social aspects of sustainability [5]. The broad definition of sustainability has been reinterpreted in the domain of information systems to address challenges in the design and implementation of sustainable IT solutions [6-9]. According to [8], sustainable IT is a technology that is capable of being maintained over a long span of time independent of shifts in both hardware and software. Other than that, [10] defined a sustained programme or project as a set of durable activities and resources aimed at program-related objectives. This current research worked around the definition of sustainability by [8] and [10].

1.3 Sustainability Dimensions

Sustainability is not only about being better environmental stewards, but it should also include giving a comprehensive response to both the internal and external impacts of social, cultural, and resource trends [11]. As managers internalise strategic approaches and responses that encapsulate these four sustainability factors, only then will that the organisation, whether public or private, be able to adequately sustain its existence in the future. In other discussion, most researches consider sustainability to be closely linked to the ability of a project to be financially sustainable, in that a project must be capable of cost recovery in order to be continuously operative and dynamic in the services they provide [12]. However, sustainability encompasses more than just the financial or economic aspect of the project; it also considers other significant facets such as rootedness in local communities, cultural and political acceptance, and value to rural individuals [13]. Therefore, ICT projects have to take these aspects into account. Most ICT projects have been proven to be unsustainable in the long run because they have not been accompanied by, or failed to, generate the broader economic and social changes [14], which would consequently lead to unsustainable demand for ICT resources in rural development. Five main dimensions of sustainability in the ICT4D literature have been identified namely financial sustainability, social sustainability,

institutional sustainability, technological sustainability, and environmental sustainability [15]. There is a need to integrate all these five dimensions as they are vital elements in the planning and operation of ICT projects [16]. Many studies refer to sustainability as a key to long-term development outcomes for ICT projects. Other than that, there are three dimensions of sustainability as follows: (1) economic sustainability (achieved when a given level of expenditure can be maintained over time); (2) social and cultural sustainability (achieved when social exclusion is minimised and social equity is maximised); (3) and institutional sustainability (achieved when prevailing structures and processes have the capacity to perform their functions over the long term) [17]. This current research adopts these three dimensions of sustainability. The dimensions are as follows:

Social and Cultural Sustainability: This dimension considers the social and cultural context in which a project operates, and the impacts of the ICT project to this context. As the ICT project takes into account the social and cultural aspects of the community, people in the community feel empowered by the project and hence they become active in seeking ways to keep the project running as it is in their own vital self-interest [16]. According to [17], as a consequence to considering social and cultural sustainability, social exclusion is therefore minimised, and social equity is continuously built on and not undermined.

Economic Sustainability: This dimension could be associated with the level of expenditure that can be sustained in the long term [17]. ICT projects in rural areas are initially funded by development organisations; however, in the long term, the ICT services provided will need to develop cost recovery mechanisms to generate enough income to keep the project sustainable. [18] indicated that the ability for ICT services to be financially self-sustainable is a key concern; hence, there is a need to promote a spirit of entrepreneurship to market ICT services rendered and to secure grant contributions.

Institutional Sustainability: Institutional sustainability is achieved when structures and processes of an organisation are able to perform their functions over the long term [17]. Aspects of institutional sustainability that need to be put in place include well-defined ICT laws, participatory policy-making processes, and effective public and private sector organisations that develop a framework in which the livelihoods of the community can be continuously improved.

2. Case Study: *Pusat Siber Rakyat* (PSR)

Malaysia consists of thirteen states and three federal territories, and is separated into two similar sized regions, Peninsular Malaysia and Malaysian Borneo. The Malaysian capital city is Kuala Lumpur, while Putrajaya is the seat of the federal government. The state, which is situated at the west of Malaysia, is one of the richest states in Malaysia. This state is also the most developed in Malaysia with good infrastructure and infostructure. This state also has the largest population in Malaysia. There are nine districts and all nine districts involved in the PSR project.

The cyber community centre or locally known as *Pusat Siber Rakyat* (PSR) was established in 1999 to serve the needs of ICT usage for the local community in the state. Formerly, it was known as *Pusat Komuniti IT* (PKIT) or information technology community centre with the vision to increase ICT literacy among the state's community. There are 39 PSRs in the nine districts under responsibilities of the State Public Library and State Federal Office. Each PSR is equipped with minimum six computers for users, one computer for administration, one scanner, one printer, and a dial-up internet connection for all computers. For the past ten years of their operation, the facilities have benefited the users, especially those in rural and sub-urban areas of the state. Nevertheless, these PSRs have many management and operational problems, which have lead to discontinued services of a few PSR facilities. The State Federal Office through their ICT Department has noticed the PSR operational problems and is looking forward to overcoming all the problems in sustaining the PSR. Table 1 shows the number of PSR by district.

Table 1: PSR by District and the Responsible Agencies

Location	Number of PSR	Responsibility of	
		State Federal Office	State Public Library
District 1	9	3	6
District 2	6	5	1
District 3	5	5	0
District 4	5	4	1
District 5	4	3	1
District 6	3	2	1
District 7	3	3	0
District 8	2	2	0
District 9	2	1	1

Source: State's Economic Planning Unit (UPEN), 2010

This current research was conducted at the 9 districts involving 26 PSRs. Data from semi-structured interview, observation, and document reviews were collected from

the State Federal Office's officers and the users at each PSR.

3. Methodology

The overall research investigation examined the implementation of ICT hubs. The study aimed to draw general lesson where an exploration of the criteria of sustainability formed a part of the overall research investigation. A survey was conducted, where a case study qualitative research methodology was adopted to assess the ICT hubs project in a real-life environment [19]. Techniques employed in data collection were semi-structured interviews, non-participant observations, and document reviews. Data were collected from 26 ICT hubs. The main instrument used in this research was semi-structured interviews questionnaire.

Semi-structured interviews: Semi-structured interviews were done with two groups of respondents. The first group represented people who were responsible in managing and running the ICT hubs. The officers were contacted and appointments were made prior to the interview date. A total of 28 officers responsible for the operation of the hubs were interviewed. Each of the interview session lasted between 45 to 90 minutes and data gathered were transcribed. The respondents were asked on their routine operation activities of providing services to the customers, challenges and problems in administrating the hubs, their perception on how the hubs could be sustained, experience in operating the hub, and the history of the hub from the first day it was opened to date.

The second group interviewed was the community. 64 respondents from the community who had been using the facilities in the ICT hubs were interviewed separately from the first group of the respondent. The second interview was done with the intention of exploring the users' perspectives on the uses and challenges of ICT hubs, and the project's approach to promote sustainability.

Non-Participant Observations: Apart from the semi-structured interview, researchers were also exposed directly to the operations associated with the hub through observation of the administrators' and users' activities at the hubs for two weeks. 26 hubs were visited within the three weeks period and observation of how the hubs operate was documented. The observation focused on how the operators handle their daily operations of the hub where the users involved particularly on how the service was served to the users at the hub. The observation included the process of registering the users' attendance, recording the users' activities (i.e., printing, browsing the

Internet, scanning, etc.), and recording the maintenance of the software and hardware supplied to the hubs. There were hubs that were still in operation but did not have many users. The hubs were in a good condition but the hardware and software were obsolete. There were abandoned hubs with hardware broken and not fixed.

Document Reviews: To help the researchers to understand the processes observed better, documentations of the PSR operation activities were examined. These included the attendance log, the usage log, and the maintenance log. Data from the documents were reviewed and analysed, conforming what was previously observed at the hubs. Attendance for the first 2 years was high with an average of 30 users per day. After 2 years, there was a decline in the number of visitors as recorded in the log book. In some cases or hubs, the hubs were closed from operation.

4. Result Analysis and Discussion

4.1 ICT Hub Sustainability Criteria Model

From the result analysis, there are eight significant criteria that directly influence the sustainability of the ICT hubs, namely community development, ethics, social network, financial support, people, infrastructure, policy and strategy, and political influences. These criteria are then categorised into three dimensions as mentioned in the earlier section accordingly. Figure 1 depicts the eight criteria identified and categorisation made to the criteria into three sustainability dimensions.

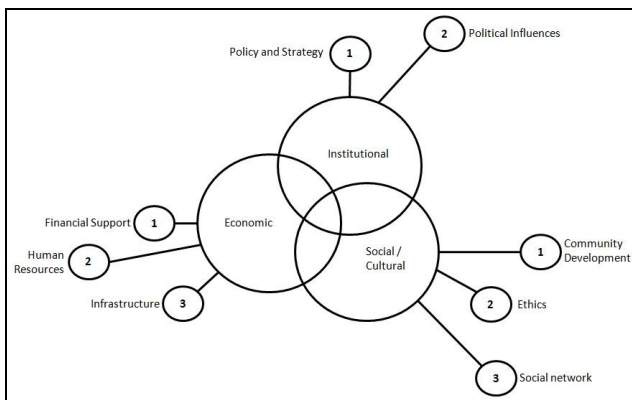


Fig. 1 Proposed ICT Hubs Sustainability Criteria Model

As discussed earlier, the social and cultural dimension takes into account the social and cultural aspects of the community and how people in the community feel empowered by the project and become active in seeking ways to keep the project running as it is in their own vital

self-interest. There are three criteria that fit into this dimension: community development, ethics, and social network.

Community Development: The hub could be used as a medium for personal development opportunities for the community via learning environment. The role of the Internet connectivity is to create the learning environment and to enable linkages between local community and outside world. It also helps to encourage local ownership, to establish the community of practice (CoP), to facilitate local content development, and to create technically literate user. This hub also serves as a platform for communication between the government and citizen through the e-government application. This is especially significant for the low-income earners as it helps them to communicate directly to the Government without discrimination and bureaucracy barriers.

“...I know how to use computer and Internet. I learned it at school but my mother and her friends attended the computer classes held here, and had made them an expert on how to use the computer and Internet...”
(Respondent29- user)

“...at first the majority of users who came to use the facilities were teenagers and schoolchildren. But when we started to introduce our computer classes for the community, more adults and senior citizens came to the centre. Some of them came to get more information from the government agencies’ official websites, some came to download tax forms, and there were also people who paid their bills. I, for an instance, could use the Internet facility to email my child who’s now studying in Australia...”
(Respondent10- PSR Officer)

Ethics: ICT hub should also be administered with some guidelines or code of conduct to ensure its sustainability. It is important for the users to be able to differentiate between what is right and what is wrong. Thus, ethical practices among the CoP are mostly important especially as it involves users from all ages.

“...I hope the operator could monitor the PSR usage by the children and teenagers. We, parents are worried if the children here use the Internet unethically. If there is no monitoring, it would be difficult for me and my husband to allow our children to come here and use the facilities...”
(Respondent32- user)

“...In my opinion, any public ICT centre should have clear ethics guideline on the use of the facilities. If it is not in place, then this centre no longer provides value and positive impact towards community development. At this centre, my staff and I will always ensure the users especially the teenagers do not abuse the Internet facilities

provided. They are monitored and prohibited from surfing some websites that could give negative impacts in shaping their personality...

(Respondent6- PSR Officer)

Social Network: Another contribution of the Internet is that it helps people from different location to communicate easily. People can connect to each other by many ways that they feel comfortable with. People want to stay connected, and with the help of e-mails and other applications, the social networking is easily done and maintained. Having the hub with reliable Internet facility is now a mandatory.

"...I come here to use FB (Facebook). I could chat with my friends who are far away from here and we share stories. We even share recipes ..."

(Respondent17- user)

"...I had resigned from my work. So, with this PSR, I could come and use the Internet to communicate with my ex-officemate..."

(Respondent32- user)

"...from my observation, there are users who always come here just to open and use their Friendster and Facebook accounts..."

(Respondent10- PSR Officer)

The second sustainability dimension is economic dimension. Three criteria are categorised into this dimension namely financial support, human resources, and infrastructure. Like the first dimension, these three criteria are the most cited and mentioned criteria by the interviewees. Based on the observation and documentation reviewed, it was obvious that strong financial support, adequate human resources, and good infrastructure will ensure the hub's life-long usage. Alongside with strong financial plan, spirit of entrepreneurship to market ICT services is also important to enable the hub to be self-sustained. On top of that, human resources factor, which is the centre of the operation of any ICT hubs, is also taken into account.

Financial Support: It is clear that the hubs need to be funded for a long period to provide the hub with enough time and effort to grow and nurture. A thorough and detailed execution plan of financing strategy is needed. A schedule and sufficient financial allocation or support for each PSR is required, especially for seed money. A financial strategy that empowers the PSR operators to manage their own financial affairs (including generating and distributing income) is also seen as important by the respondents. This is an investment for producing future champions – a life-long working ICT hub.

"...there are 2 critical and important factors to maintain and sustain this centre. First, a scheduled financial support, in terms of money and allocation, and the second factor is a fulltime qualified ICT staff ..."

(Respondent6- PSR Officer)

"... if we don't have yearly budget from the Government, it's hard for us to maintain this PSR. I've heard that a centre has been shut down due to this reason ..."

(Respondent10- PSR Officer)

"...the government did not have a proper yearly budget for this PSR. We don't have enough allocation to maintain this centre. The state ICT centre's officer just comes for the maintenance only twice a year. But, you know, when dealing with computers for public use, we need to service it more often..."

(Respondent12- PSR Officer)

"...Here in my centre, we need a budget allocation to maintain it. Our office is the Chief Office (Pejabat Penghulu). We don't have budget for computers, and we need special allocation for this purpose..."

(Respondent22- PSR Officer)

"...Money is the most critical factor to maintain and sustain this centre... Why I say this? Every year, we need to service the computers, clean them from virus, sometimes format the hard disk and change the faulty devices especially the mouse... state's officer just comes twice a year, but our computers always have problem. Now, at my PSR, there are 3 computers not functioning, we couldn't turn on the computers. I don't know why they are so, so we just put those computers aside; we don't have enough money to send them for service ..."

(Respondent26- PSR Officer)

Human Resources: Evidently, the issues on staff competency and qualifications, staff incentive, and dedicated and permanent staff appointment dominate the human criteria. The hubs are desperately in need of qualified permanent staffs who could provide and deliver better service needed by the community, for examples, in conducting computer classes and doing simple maintenance tasks on the computers when necessary.

"...there are 2 critical and important factors to maintain and sustain this centre. First, a schedule financial support in term of money and allocation, and the second factor are a fulltime qualified ICT staff ..."

(Respondent6- PSR Officer)

"We need a fulltime qualified staff to operate this centre. With this fulltime staff, other than making sure the centre can be opened daily, the centre could also give more services to the community such as scheduling and

conducting a computer workshop, scan service, and other computer-related services.”
(Respondent26- PSR Officer)

Infrastructure: To provide an ICT centre that offers an added value to its users, it requires updated technology, reliable Internet access, comfortable ICT services centre, and continuous and scheduled maintenance of ICT devices. Accessible and reliable, if not a state-of-the-art, infrastructure is very important and this will ensure user satisfaction and continuous ICT centre services.

“...other than that, a comfortable ICT service centre is another criteria to making sure its sustainability.”
(Respondent6- PSR Officer)

“...during the transition of state government reign, the centre was broken in. A few computers that were in good condition were stolen, but there was no sign of forced entry; however, it is known that this centre is not really secured and needs to be improved...”
(Respondent22- PSR Officer)

“...one more, in my opinion, the Internet access here needs to be improved. I always have to wait for a few minutes just to open my email, it’s too slow...”
(Respondent32- user)

“...other than improving the Internet access, the operator should carry out regular maintenance works. If there is any computer infected by viruses, it must be cleaned up immediately. Sometimes it was found that the (computer) mouse could not be used, it needs to be serviced...”
(Respondent33- user)

Finally, institutional sustainability does play a own role in sustaining the ICT4D project. Institutional sustainability ensures well-defined ICT laws and policy are in place by the authoritative party(s) and it also promotes for the public and private organisations to work hand-in-hand in developing, owning, and maintaining the hubs through their active participations. Based on the transcribed interviews, two criteria have been identified and categorised under institutional sustainability: policy and strategy, and political influences.

Policy and Strategy: In previous study, [2] mentioned about policy and strategy as influencing factors in sustaining community ICT hubs. Policy makers are responsible to derive a set of policy and strategy and then disseminate them to the related parties. When there is clear policy and strategy, these will help in identifying the roles and responsibilities all the related parties should play. This leads to a proper organisational structure that helps to

identify the roles and responsibilities of each party involved. Following that, a continuous monitoring, control, and evaluation that are compliant with government rules and regulations will easily be executed. Thus, it is highly important for any ICT4D project to have project ownership so that the project champion would have full authority to delegate work and provide continuous support and commitment. The project champion is the responsible party(s) that focuses on the following: (1) strategising the existing public facilities for each ICT service centre at strategic location; (2) making sure systematic documentation on facilities and operations, and hand them over when there is change in management; (3) implementing affordable membership fees; and (4) providing value-added services to users with minimum charge, for examples, computer classes, and scanning and printing services.

“...to me, we should have a proper SOP and a clear structure of the people involved in managing and maintaining this centre...”
(Respondent6- PSR Officer)

“The Government should give full support and commitment especially in terms of monetary, allocating a qualified staff to operate all PSR, and in making it a successful and sustained project.”
(Respondent22- PSR Officer)

“At our centre, we have do a systematic documentation on the centre’s operation and maintenance. We have a schedule on the community development, for example the computer workshop. We do have a strategic location of our PSR and people do come to utilise our service. But, I strongly believe if we would like to sustain the success of this PSR, we need sufficiently allocated money and dedicated staff to do it.”
(Respondent6- PSR Officer)

Political Influences: A well-defined project ownership regardless of political changes in management is relevant in any projects. The project champion that is free from any political influences will enable a clear workflow to be exercised whenever there is a need of handover. A clear defined roles and responsibilities of all parties involved in the handover will then make a smooth transition process that will be almost unnoticed by the users. This is highly applicable especially when there is a transition of the state government reign.

“...there was a handover problem between the old operator and new operator during the transition of state government reign that happened not long ago. It happened because there was a new appointment (operator) and both operators were representing two

conflicting political parties and they have different views on how the PSR should be managed.”
(Respondent22- PSR Officer)

“...during the transition of state government reign, the centre was broken in. A few computers that were in good condition were stolen, but there was no sign of forced entry; however, it is known that this centre is not really secured and needs to be improved There were a few allegations made that some fanatic supporters of the political turmoil had intentionally made the computers “disappeared” to blame certain parties..”
(Respondent22- PSR Officer)

4.2 Hub Lesson Learned

The presented case allows us to draw some important lessons and provide recommendations for policymakers in other similar ICT4D future projects. The ICT hubs at all 26 sites have great potential to be sustained if the project champion that is free from any political influences is identified. Before the project could even start, the project champion must be equipped with a comprehensive policy and strategy to ensure smooth administration. Continuous financial support to run the ICT hubs with adequate resources and good infrastructure for the community development has been identified to be crucial. Ethical use of the facilities and their applications are also important to ensure a life-long usage as it helps parents to be rest assured of the quality of services provided by the ICT hubs. Moreover, ICT hubs also help the community to reach out to the Government, or to their social acquaintances and friends through social network. In order for the whole model to work, the human factor is utterly important. Good people resources will ensure all the other mentioned criteria are synergised and exploited to their maximum potential in delivering sustainable ICT4D project.

5. Conclusions

For community ICT hubs provision to contribute to mainstream development, there is a need for evidence-based interpretation from the real project perspective. Therefore, this study concludes eight sustainability criteria of PSR project according to the three sustainability dimensions adopted from [17]. The three criteria classified under social and cultural dimension are community development, ethics, and social network. Next, another three criteria grouped into economic dimension are financial support, human resources, and infrastructure. Finally, the criteria policy and strategy, and political influences are categorised under institutional dimension, which are also significant to the sustainability of community ICT hubs. It is recommended to use these ICT

hubs sustainability criteria model as a guideline for future development of community ICT hubs to ensure they will be fully utilised and give high impact to the society. Hence, by applying this model, it is expected that the failure to sustain the community ICT hubs will be decreased.

The sustainability criteria model proposed in this research open for further research to investigate the implementation of community ICT hubs in developing countries. Future research on the measurement of the most significant criteria towards community ICT hubs sustainability, among other examples, could also be conducted. Study to provide evidence whether the ICT hubs sustainability criteria model is an adequately valid and reliable instrument to measure the implementation of community ICT hubs is also relevant. Further investigation is still needed and it might focus on using confirmatory research approach to revise and improve the model.

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References

- [1] R. Heeks, "Information systems and developing countries: Failure, success, and local improvisations," *The Information Society*, vol. 18, pp. 101-112, 2002.
- [2] S. Basaruddin, *et al.*, "Influencing Factors for Effective Community ICT Hubs," *World Applied Sciences Journal*, vol. 11, pp. 114-117, 2010.
- [3] R. Heeks, "ICT4D 2.0: The Next Phase of Applying ICT for International Development.," *Computer*, vol. 41, pp. 26-33, 2008.
- [4] Global Reporting Initiative. (2006, November 2010). RG Sustainability Reporting Guidelines Version 3.0. Available: www.globalreporting.org/ReportingFramework/G3Guidelines
- [5] C. R. Carter and D. S. Rogers, "A framework of sustainable supply chain management: moving toward new theory," *International Journal of Physical Distribution & Logistics Management*, vol. 38, pp. 360-387, 2008.
- [6] J. Reynolds and W. Stinson, "Sustainability analysis," presented at the Primary Healthcare Management Advancement Programme, Bangkok, 1993.
- [7] M. Korpela, *et al.*, "Blueprint for an African Systems development methodology: an action research project in the health sector," in Avgerou, C. (Ed.), *Implementation and Evaluation of Information Systems in Developing Countries*, International Federation for Information Processing, Vienna 1998, pp. 173-286.
- [8] G. Misund and J. Hoiberg. (2003, February, 2012). Sustainable information technology for global sustainability. Digital Earth. *Information Resources for*

- Global Sustainability Symposium*. Available: http://www.ia.hiof.no/~gunnarmi/omd/dig_earth_03/
- [9] G. Z. Oyomno, "Sustainability of governmental use of microcomputer-based information technology in Kenya," in *Mayuri Odedra-Straub (Ed.), Global IT & socio-economic development*, Marietta, GA, 1996.
- [10] M. Scheirer, "Are the levels of institutionalization scales ready for prime time? A commentary on development of level of institutionalization scales for health promotion programs," *Health Education Quarterly*, vol. 20, pp. 179-183, 1993.
- [11] A. Werbach, *Strategy for Sustainability: A Business Manifesto*: Harvard Business Press, 2009.
- [12] C. Pade, *et al.*, "An Exploration of the Categories Associated with ICT Project Sustainability in Rural Areas of Developing Countries: A Case Study of the Dwesa Project," in *Proceedings of SAICSIT 2006*, 2006, pp. 100-106.
- [13] K. Keniston. (2005, January 2011). Notes on Sustainability. Available: http://web.mit.edu/~kken/Public/PAPERS/on_sustainability.html
- [14] K. S. McNamara, "Information and Communication technologies, Poverty and Development: Learning from Experience," The World Bank, Washington DC2003.
- [15] M. Ali and S. Bailur, "The challenge of "sustainability in ICT4D – Is bricolage the answer?," presented at the 9th International Conference on Social Implications of Computers in Developing Countries, Sao Paulo, Brazil, 2007.
- [16] K. Stoll. (2003, December 2011). Telecentres Sustainability: What Does it Mean? Available: <http://topics.developmentgateway.org/ict/sdm/previewDocument.do~activeDocumentId==442773>
- [17] S. Batchelor and P. Norrish. (2003, September 2010). Sustainable Information Communication Technologies (ICT). Available: <http://www.sustainableicts.org/Sustainable.htm>
- [18] The World Bank, "ICT for Development Contributing to the Millennium Development Goals: Lessons learnt from Seventeen InfoDev Projects.," The World Bank, Washington DC2003.
- [19] R. K. Yin, *Case Study Research: Design and Methods* vol. 5. Thousand Oaks, California: SAGE, 2009.

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